

October 1945

# Chemical Industries

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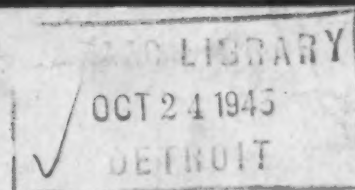
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NICARAGUAN NICKEL

Nickel from Cuban Ore by Ammonia Leaching p. 621

NY

London

*IN PEACE* ... as in war

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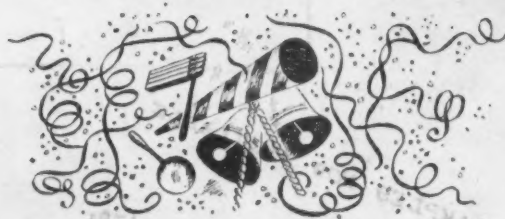
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CHEMICALS

THE CHEMICAL  
BUSINESS MAGAZINE

VOLUME 57  
NUMBER 4



# Chemical Industries

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COVER: Plant of the Nicaro Nickel Company at Nicaro, Oriente Province, Cuba.

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# ABOUT THE AUTHORS

MAURICE F. DUFOUR, who joins Robert Hills in the writing of "Nickel From Cuba," page 621, was born in New



*Dufour, administrative manager Forbes Wilson, and Hills confer.*

Orleans, La. He entered Tulane University in 1926 and graduated in 1930 in chemical engineering. In October of 1933, he joined Freeport Sulphur Company as chemist at Hoskins Mound laboratory. Later he transferred to a new plant at Grande Ecaille and began work on a sulphur purification problem. In 1942 he started work on the Nicaro project including research, design and operation.

ROBERT C. HILLS' background is similar to his co-author's in several aspects. He, too, was born in New Orleans, and studied at Tulane, graduating with the degree of Bachelor of Science in Chemistry. He then attended Cornell University, where he received his M.S. degree with a geology major and a chemistry minor.

He joined the Freeport Sulphur Company as chemist and, like Mr. Dufour, he worked at the Grande Ecaille laboratory. During the period 1934 to 1940 he worked on water treatment, sulphur purification, by-product sulphur problem, research related to manganese operations and organic sulphur compounds. Since 1940 he has devoted himself to the Nicaro project, starting with initial investigations and including design and operations.

M. F. CRASS, JR., assistant secretary of the Manufacturing Chemists' Association, Washington, D. C., writes (page 629) about the new pressure carboy designed for transportation of reagent grade acids. The carboy was developed jointly by the M.C.A., the Owens-Illinois Glass Co. and the Interstate Commerce Commission. Mr. Crass was secretary of the technical committee for this project.

RANDY SHEELINE, author of "The History of Rocket Development," page 634, is well prepared to write on this



subject, having spent four years working on the development of high explosives and propellants, first for the War Department at Picatinny Arsenal, Dover, N. J., and later for the Navy Bureau of Ordnance in

Washington, D. C. He has been particularly active in the evolution of flashless rounds for cannon and rocket propellants and associated rocket components. His experience also includes development and time study work at the Essex Rubber Co., Trenton, N. J.

Highlights in Randy's background are the facts that he is a native New Yorker, he received his B.Ch.E. from the Polytechnic Institute of Brooklyn in 1938, and two years later, M.S.Ch.E. from the University of Michigan. His activities in technical societies have reflected his interest in professional status, professional unionization, public recognition and state-licensing.

Randy has proved his merit as a photographer, with pictures appearing in CHEMICAL INDUSTRIES and other publications. This hobby provides a happy combination of fun and wide professional ties.

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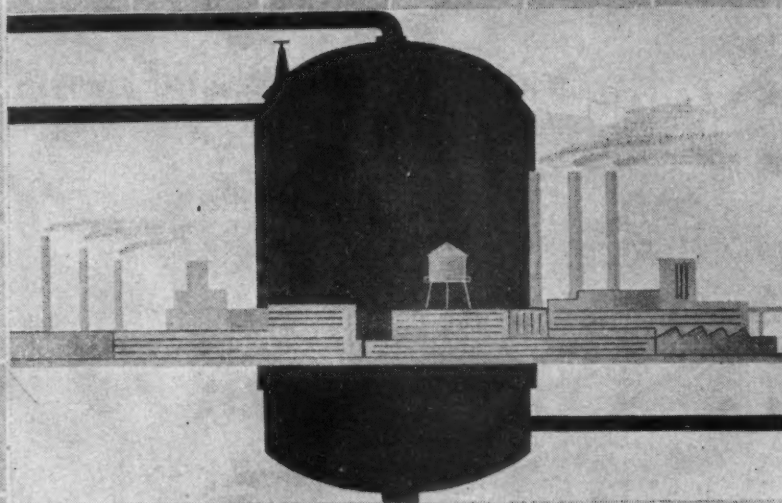
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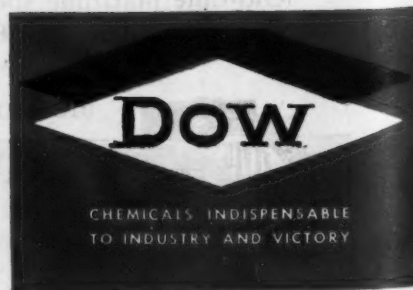
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## The Months Ahead . . . German Technical Data . . Research Bills Light Metals Policy . . . Gas Industry Hearings

### The Outlook

CHEMICALS HAD A LARGE SHARE in the achievement by United States industry of a volume of production during the war that "astounded the world," as War Production Board summed it up.

Chemicals, petroleum, rubber and rayon, were included in the list of the large peacetime industries which, converting fully to war, expanded their output between 100 and 200 percent. Of the total wartime work force, about 21 percent was engaged in the four typical new war industries—explosives, light metals, aircraft and shipbuilding. Chemicals, petroleum and rubber increased their share of the work force from a previous 5.6 percent to 6.8.

In expansion of facilities the growth of the chemical industries has been spectacular, says a War Production Board analysis of production patterns. It has amounted to well over 100 percent, according to this source, which gives this branch of production a share of from 8 to 12 percent of the nation's industrial plant. All other industries except metals and chemicals accounted in 1944 for 47 percent of the total industrial plant, as against 60 percent in 1939.

War production of all categories still scheduled through the first half of 1946 after the victory in Japan totaled \$10 billions, about a third of the figure in August. Sub-contracts are not included in the figure. An industry-wide survey by War Production Board has since indicated that reconversion in all industries is progressing faster than was first anticipated. This has obvious implications for the chemical industries.

Industry spokesmen currently anticipate a drop in chemical production in the remaining months of the year, incident to curtailed war output in all fields. The pick-up, lacking war consumption, necessarily must come from reconverting chemical-consuming industries. This pickup is now expected early in the coming year, and the prediction is encouraged by general War Production forecasts of December peacetime production at 112 percent of the prewar rate, and employment at 96 percent of this rate, which by June next year is expected to go to a production rate of 187 percent of normal production and employment to 133 percent. These figures apply to all industries and relate to the 1939-41 base period.

### WPB Liquidating War Controls

AS AN ADMINISTRATIVE AGENCY, WPB will remain until about the end of this year. However, many key figures have returned to active business, and others are going at frequent intervals.

### New Rubber Board

CONSIDERABLE INDUSTRY INTEREST centers in the activities of a new Interagency Policy Committee on Rubber, established this month by John W. Snyder, director of War Mobilization and Reconversion, to be headed by William L. Batt, vice chairman of War Production Board.

The announced function of the new board will be to survey the programs, plans and problems of Federal agencies concerned with natural, synthetic and reclaimed rubber, and make the "appropriate recommendations" to the Director. "The ultimate objective underlying the creation of the Committee is the establishment of a coordinated national policy on rubber," Mr. Snyder stated.

In his announcement, Director Snyder pointed out that "now that hostilities have ceased, the normal sources of natural rubber will soon again be accessible and it appears that after a few years there may be a serious surplus of rubber."

The national defense needs of this country, he continued, and the maintenance of stabilized economies here and in producing areas abroad require the adoption of a coordinated United States policy for an adequate supply of rubber—both natural and synthetic—to satisfy the strategic requirements of the United States; that it provide, with a minimum of interference with international trade, for expanding supplies of natural and synthetic rubber at reasonable and stable prices, and that it encourage research and development with respect to synthetic rubber.

Instruction to the committee are that it survey the plans and programs for maintaining a synthetic rubber industry, maintain stand-by rubber plants, dispose of surplus rubber plants, encourage research and development in rubber, establish a strategic stockpile of rubber, and examine the development of wild and cultivated natural rubber in South America and the establishment and maintenance of a "mutually advan-

tageous program" for importing natural rubber from the Far East.

### German Technical Information Being Distributed

FOLLOWING SOME EARLY MIX-UPS, a clear-cut organization is now being established to insure rapid and orderly dissemination of valuable technical data acquired by the various industry missions that have returned from Germany after examining that country's chemical production and industry secrets.

A Joint Publications Board has been set up, of which John Green is executive secretary. He is well-known as head of the National Inventors' Council. The Board will have offices in the Department of Commerce and will decide what material should be issued, also pass on individual requests for data.

The publication schedule is being expanded almost daily. The first three reports to be made public cover German synthetic rubber in tire manufacture, medical and mechanical goods. The tire report has been distributed. Others ready include a survey of the German magnesium and electrolytic chloride industry; a summary of developments of X-ray equipment in Germany; and a captured report on advances in acetylene chemistry.

The rubber tire report makes some favorable comparisons between the very rapid growth and production of synthetic rubber in this country with the more established but slower German industry. It also found the American industry ahead in scientific testing of finished tires, and in the orderly conversion to a war production. The mission was successful in obtaining complete technical data on compounding, construction, processing and production methods in Germany. In a very large portfolio of data of every kind, there were found two compounding materials unlike anything in general use in this country—koresin and plasticator No. 32—of which the former may be of interest as a tackifier and later as a plasticizer.

Koresin is described as a tertiary butyl phenolacetylene condensation product, and the plasticizer is otherwise designated as Buna 32, a viscous low molecular weight sodium polymer of butadiene. Full details on each, as well as many other special compounds or products in use in the German industry, were recovered by the mission.

The report on the magnesium industry indicated that German production was about 190,000 pounds of metal per day, with 54,000 pounds of this total produced by I. G. Farbenindustrie in the three cities of Bitterfeld, Stassfurt and Aken. The report on this industry is also very detailed.

From other sources, it is stated that selected German industries have been permitted to continue limited production of critical needs abroad. Soap, fertilizer and insecticide manufacturing plants have been authorized to commence operations. Among others, oil seed plants are operating. Heavy industry generally has not been allowed to operate except to fill a specific military requirement.

### Light Metal Policy Urged by Senate Subcommittee

CHARGING THAT THE PREWAR LIGHT METALS INDUSTRY of the United States was "totally inadequate" for national defense, and that the plants then forming the backbone of the industry were vulnerable to enemy attack, the Senate subcommittee on Surplus War Property has recommended an exhaustive study of the whole policy affecting retention of plants, utilization of metal, and development of alumina and bauxite resources. Foreign explorations would be undertaken also, through the help of the State Department.

Among other recommendations are one that the Government should sponsor research in low production costs of light metals, improved fabrication techniques, and wider use of this type of metal. The committee attacked what it termed patent agreements and other restraints, which it said had retarded the development of a light metals industry in the past.

"The patent laws should continue to protect the rise of inventors and offer every proper stimulus to invention, but they must not be used for monopolistic purposes in contravention of the interests of national defense and the general welfare" the committee reported, in advocating that patent information and "know-how" be made more generally available to producers.

The committee recommended freight rate revisions downward, including ocean freight rates, a study of Panama Canal tolls, and other rate revisions affecting shipments of raw materials particularly if these steps would aid in developments on the Pacific coast.

Cancellation of import duties on bauxite imports into the United States was recommended, together with a study which by inference looks to reduction or elimination of other such charges affecting aluminum.

Stockpiles were recommended for national defense, including bauxite, aluminum, and magnesium, with Government purchase of output that will aid in disposal and operation of surplus Government plants.

### Research Bills Criticized

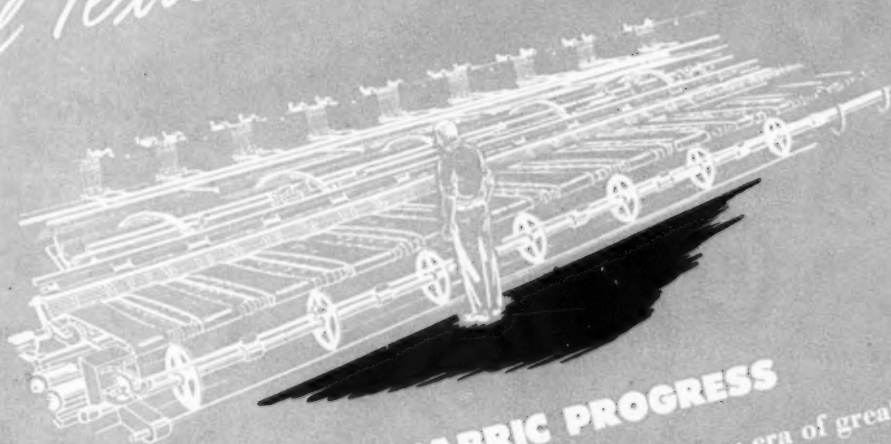
FROM AN INFORMED STUDENT of pending patent legislation, Bruce K. Brown, Chicago research executive, has come a penetrating analysis of the Magnuson bill, S. 1285, and the Kilgore bill, S. 1297, together with some differences appearing between the Kilgore report on the need of a Government Science Foundation, and the report to the President by Dr. Vannevar Bush, director of the Office of Scientific Research and Development.

Of the two, Mr. Brown appears to favor the Magnuson bill as being more flexible. Of the Kilgore measure, he points out that all inventions and discoveries "resulting from" projects financed in whole or even in part by the Government become the absolute property of the United States. Small industries, if they accepted the Government's research funds on the terms

(Turn to page 570)

ADVENTURES IN THE  
"MARGIN OF  
EXPERIENCE"

# The Textile Industry



## ARCHITECT OF FABRIC PROGRESS

The textile industry is now entering a new era of great promise. Not only are the traditional materials such as cotton and wool being given remarkable new qualities but entirely new yarns and fabrics are being "created" in whole cloth by those architects of fibres... the textile chemists.

As a result, textiles are performing many functions and solving many problems where their use had never been considered before. It is possible, for instance, to produce a fabric today that would resist fire, salt water, mildew, moths, perspiration, decay—and at the same time have a finer appearance and take dyes better.

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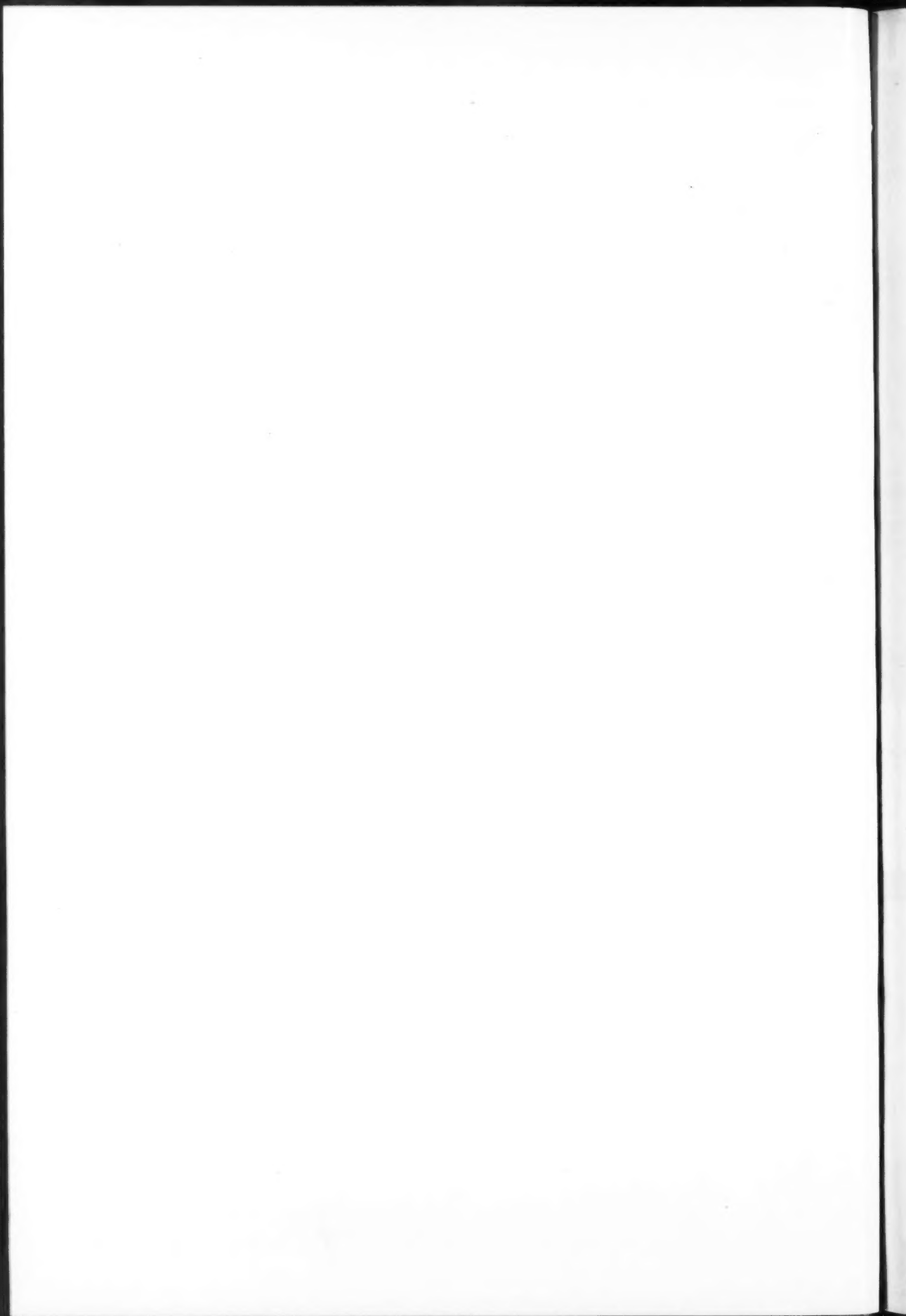
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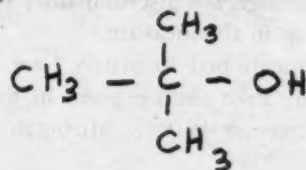




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Tertiary Butyl Alcohol is included in formulations for dehairing pigs in packing houses . . . and enters the manufacture of synthetic perfume musks and other compounds, such as anti-oxidants for stabilizing refined lubricants and edible oils and fats.

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## SPECIFICATIONS

Purity . . . . .	Minimum 99% tertiary butyl alcohol by weight
Specific Gravity 25°/25° C. . . . .	0.781 to 0.784
Color . . . . .	Maximum 10 platinum cobalt (Hazen) standard
Water . . . . .	Miscible without turbidity with 19 volumes of 60° B. gasoline at 20° C.
Acidity (other than carbon dioxide) . . . . .	Maximum 0.003% calculated as acetic acid
Distillation Range . . . . .	Below 81.5° C. None (A. S. T. M. D268/33) . . . Above 83° C. None
Freezing Point (first needle) . . . . .	Above 24° C.
Non-volatile matter . . . . .	Maximum 2 mg. per 100 ml.
Weight . . . . .	6.52 lbs. per gallon at 25° C. (approx.)

## PHYSICAL PROPERTIES

Below are tabulated the more commonly used physical properties of anhydrous tertiary butyl alcohol:

Specific Gravity 26°/4° C. . . . .	0.7791
Boiling Point at 760 mm. . . . .	82.4° C.
Melting Point . . . . .	25.6° C.
Flash Point, Tag Open Cup . . . . .	60° F.
Tag Closed Cup . . . . .	48° F.
Vapor Pressure at 30° C. . . . .	57.3 mm. Hg.
40° C. . . . .	103.0 "
Specific Heat	
Crystal at 2° C. . . . .	0.560
Liquid at 27° C. . . . .	0.726
Refractive Index, $N_D^{26}$ . . . . .	1.3841
Coefficient of Expansion . . . . .	0.000740 per °F.
Latent Heat of Vaporization . . . . .	130.6 gm. cal. per gm.
Latent Heat of Fusion . . . . .	21.0 gm. cal. per gm.
Miscibility . . . . .	Completely miscible with water in all proportions

Azeotropic Data: Tertiary butyl alcohol forms a constant boiling mixture with water at 79.9° C., containing 88.3% alcohol by weight.

For further properties and uses communicate with either of the addresses below

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## Washington

(Continued from page 568)

provided in the Kilgore bill, would, he points out further, be denied the fruits of their inventions.

Ostensibly intended to remove restraints of trade, he continues, the Kilgore bill actually promotes restraints of trade through the discriminatory powers of patent grants set up in the measure.

The document mentioned so briefly here is worth more detailed study than can be given in this space. Mr. Brown's address is 910 S. Michigan Avenue, Chicago.

### Congressional Outlook

WHILE THE KILGORE AND MURRAY "full employment" bills have attracted the most attention, they appear likely to be scaled down before any final action is taken on them in Congress.

For future study there is a third job bill now shaping, which has many implications for industry—a departmental plan drafted jointly by the departments of Agriculture, Commerce and Labor, which has the objective of further industrialization of rural sections.

### Government Subsidies for Competitors of "Monopolies" Proposed

IN THE REPORT OF THE Senate subcommittee on Surplus Property referred to earlier, a recommendation also worthy of note calls for a policy of subsidizing competition to alleged established monopolies. Under this plan the Surplus Property Board would establish competitors through selling surplus Government aluminum and magnesium plants only to new producers.

To encourage such new producers to enter the field, the Government would be required to guarantee to these purchasers of surplus plants reduced electric, freight and tariff rates, plus stimulated markets, and a plan of keeping the plants to be sold in operation at Government expense.

### Federal Power Commission Gets New Member

APPOINTMENT OF HARRINGTON WIMBERLEY, Oklahoma newspaper publisher to the FPC, is a placating move to natural gas interests, in a limited sense. These interests were pressing for some representation on one or another such agency, and the new member's knowledge of natural gas industry activities, through his association in the areas specially concerned, has met with commendation on this ground.

### Will Gas Industry Inherit Government Pipe Lines?

DISPOSAL OF THE GOVERNMENT-OWNED "Big Inch" and "Little Inch" pipe lines may have to be decided in this session of Congress. Proposals now understood to be shaping among interested industry men are that the two pipelines should be taken out of use entirely and kept in reserve for a future transportation contingency,

or if sold to private industry, should be confined to transportation of natural gas.

Some oil industry men are understood to be fearful that if retained for transportation of oil and petroleum products, their large capacity would have an adverse effect on the private oil industry.

Whether they can be converted for use of natural gas transportation also is a question. Petroleum men believe it would cost an additional \$40,000,000 to convert the "Big Inch" alone, and this would also involve secondary distribution systems. Whether private industry or the Government should undertake this additional cost is a collateral point at issue. If private industry makes any such investment, it is argued, there must be some assurance that the investment would be protected against unduly restrictive regulation, and the findings of the Federal Power Commission in its investigation of the whole natural gas industry are a part of the situation.

It is understood that the entire subject will be covered in detail in a special report to be submitted by petroleum industry experts to the Senate Petroleum Investigation, which is now holding hearings.

### Regulation of Government Corporations Again Before Congress

CONGRESS MAY GET, this session, the Byrd-Butler bill (S. 469) to regulate Government corporations, but if so, will unquestionably hear from what is virtually a Government agency lobby, opposing the basic idea involved. The companion measure, House Resolution 2177, provides for Congressional control and audit of all Government corporations including TVA. This bill was the subject of hearings prior to the recess, but apparently was sidetracked.

The multiplicity of Government corporations, and the loose administration under which they functioned, so far as any central control was evident, may change the outlook.

### Government Pipe Lines To Be Discontinued

THE NEED OF A DISPOSAL POLICY on Government pipe lines is pointed up by the disclosure, as this is written, that within the next 30 to 60 days, operation of five such oil pipelines, including the so-called "Big Inch" and "Little Inch," 24 inches and 20 inches respectively, are to be discontinued.

The other lines being terminated include the Florida Emergency Pipeline, 8 inch; an extension of the Plantation Pipe Line, Greensboro, N. C., to Richmond, Va., 8 inch; and Southwest Emergency Pipeline, 14 and 16 inches, Corpus Christi to Houston, Tex.

### Industry Committees Retained Temporarily

OVER-ALL TYPE INDUSTRY ADVISORY COMMITTEES, which have functioned in connection with WPB during the war, will be retained on an "on-call" basis during the liquidation period of WPB's activities. Certain committees, representing segments of major industries will be dissolved, but those of a more general industry representation will continue for the time being.

# Under the impetus of war...

# X-ray

## looks into new fields!

How chemical exactness aids in the making of photographic emulsions for X-ray and other films.

During the war, mobile X-ray units moved right up to combat field hospitals, helping to expedite the care of wounded.

But medical aid was not the only duty for X-ray. The sharp, searching eye of X-ray looked over virtually all combat matériel used by American armed forces, from rifle bullets to steel plates for battleships! X-ray searched out defects, helped to assure uniform performance.

Yes . . . there are many new duties for X-ray film and for all kinds of photographic films.

This has naturally called for advanced techniques in the making of photographic emulsions for film.

In making photographic emulsions, manufacturers have to deal with many variables—time, temperature, rate of precipitation, agitation, washing, ripening, sensitizing substances, etc.

It is a delicate, painstaking job—and it *demand*s fine chemicals of the highest purity *right at the beginning*. Infinitesimal amounts of chemical impurities can be responsible for important, and unwelcome, changes in speed and sensitivity of the film.

That's why the photographic industry relies upon Baker's *purity by the ton* in fine chemicals.

If you have a special requirement involving purity by the ton, we invite you to discuss your needs in confidence with Baker.

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POTASSIUM IODIDE  
SODIUM CHLORIDE



# THE READER WRITES

## Sales Control

To the Editor of Chemical Industries:

I have just finished reading Mike Cain's article "How to Organize a Sales Control System" in your August issue, and I want to tell you immediately how favorably it impressed me.

Our own system is quite similar to the system he describes. In practice, however, we short cut a few steps that he has included. For example, we prepare a monthly summary of salesmen's calls rather than a daily summary. We have the salesmen's call report typed by the district office in quadruplicate and use one copy for referral and action requirements, a second copy for tickler file, a third copy for the salesman's own book-keeping system and a fourth copy for our permanent sales control record. In this way we eliminate the tickler slip and salesman's personal record book.

MELVIN E. CLAR

Director of Market Research  
Wyandotte Chemicals Corp.  
Wyandotte, Michigan.

## Distributors in Wartime

To the Editor of Chemical Industries:

In your August issue, war catalyzes chemical progress, although "maybe this doesn't prove it" in all respects. It might be just as well for some chemical manufacturers to return to the teachings of their fathers (page 251). Good distributors can physically handle many of their products cheaper for their stockholders and better for customers.

At the beginning of the war when producers held the spotlight the president of one of the larger manufacturers told me, "It is too bad Opalco has to fold up but we will protect its customers." Opalco had built up an attractive merchandising business, owned its own warehouses and trucks, employed a number of workers over a period of years, and was not in sympathy with any idea its business could be grabbed free of charge.

The eminent author has apparently been misinformed if a blanket assumption is made that wartime prices were pegged skyhigh by jobbers. This is just another excuse for taking over.

"The simple expedient of purchasing an established company" was not employed in the attempt to lift Opalco's business. Possibly the fact that Opalco did not fold up was only due to the stubbornness of its personnel. Mr. Queeny puts it sternly in his "Spirit of Enterprise" when he refers to "bureaucratic resistance to improvement." Only a production bureaucrat can resist distributors' sales and service.

Thank you for a liberal magazine and a fine Buyers' Guidebook.

THOMAS H. FRAZIER

The Opalco Laboratory  
McKeesport, Pa.

## Chemicals in Arizona

To the Editor of Chemical Industries:

As a reader of your valued publication may I voice the opinion that the chemical industry does not fully appreciate the vast natural resources that are at its disposal in the state of Arizona?

It is also my belief that these resources can be used effectively only through establishment of a chemical industry right here in the state, rather than transport them to other processing points.

We have vast pine forests, but import pine oil from Florida. A few saw mills are the only use made of this resource. We have large deposits of pumice stone near here.

In scouting oil I encountered capped wells of saturated salt brine in southeastern Arizona. Along the border and into New Mexico are vast deposits of lignite coal. And in addition there is the power of Boulder Dam, with two additional larger dams proposed.

There is plenty of opportunity here for creating new industry where none existed before.

ROBERT E. AMES

Box 85

Williams, Arizona.

## Gardner to Head New Mining Division

Announcing the establishment of an Oil-Shale Mining Division in the Office of Synthetic Liquid Fuels, Dr. R. R. Sayers, director of the Bureau of Mines, said today that E. D. Gardner, former regional engineer in charge of the Bureau's Central Experiment Station at Rolla, Mo., has been appointed chief of the new division.

At the Bureau's \$1,500,000 oil shale demonstration plant to be built at Rifle, Colo., Mr. Gardner and his staff will direct the development of a 200-ton-a-day shale mine and supervise the installation and operation of a 1½-mile-long aerial tramway to carry the shale from the mine to the retorting plant. Immediate problems include a choice of mining methods, selection of equipment for mining and conveying the shale, and provisions for the health and safety of the miners to be employed.

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of safe packaging—metal containers, liquid-tight paper cups and containers, fibre cans and drums, steel pails and other heavy-duty containers.

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# LIFE On The



(Above) ODORLESS HOUSEHOLD SPRAYS made with CYTOX 50% DDT LIQUID CONCENTRATE control flies, mosquitos, bedbugs, moths, and other insect pests.



(Above) DDT DUSTS can be spread over mighty forests to kill costly, destructive insects such as the spruce budworm.



## DEPENDABLE DDT CONCENTRATES NOW AVAILABLE FOR COMMERCIAL INSECTICIDES

Following its successful use during the war in fighting death-dealing insect pests, there is now a tremendous demand for DDT insecticides for commercial, agricultural, and household use. Cyanamid serves as a dependable source of supply for three DDT concentrate formulations, based on DDT-Technical which meets the joint Army-Navy specifications for DDT (Jan.D-56A).

Most requirements for sanitary insecticides can be met by Cyanamid's CYTOX\*\* 50% DDT LIQUID CONCENTRATE, prepared for dilution in kerosene or other petroleum vehicles, for use in the manufacture of effective sprays for dairy barns, stables, and similar structures, as well as for dwelling houses, hotels, and public institutions.

DDT dusts of any desired concentration can be prepared with CYTOX 50% DDT DUST CONCENTRATE for use in the control of insect pests on agricultural crops or the control of external parasites on man or animal.

CYTOX 40% DDT WETTABLE POWDER is formulated for dilution with water for sprays to control insects outdoors, in barns, or on animals.

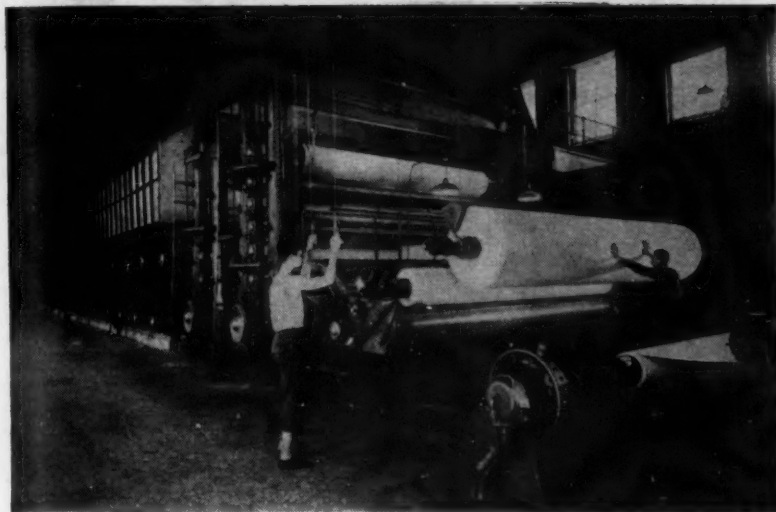
Information on the preparation of insecticidal dusts and sprays with Cyanamid's new DDT concentrates, as well as recommended uses, will be sent on request. Immediate shipments can be made.



(Above) FREE FLOWING, NON-CAUSTIC DUSTS with excellent adhesion to plant foliage can be prepared with CYTOX 50% DDT DUST CONCENTRATE to control insect pests on agricultural crops. The concentrate is easily mixed with inert diluents such as talcs and clays. These dusts will control a wide variety of insects on cotton, alfalfa, truck garden crops, fruit trees, flowers, and ornamental plants.

(Left) FLIES, MOSQUITOS, and other disease-bearing insects on beaches and other large areas can be destroyed with DDT dusts or sprays.

# Chemical Newsfront



(Left) FOR THE PRODUCTION OF FINE COATED PAPERS with smooth, level surfaces and uniform ink receptivity, Cyanamid supplies a full line of coating chemicals. Acco® brands of domestic caseins are produced under close chemical control and supplied in the principal grades such as lactic, sulphuric, and muriatic. The famous Dairyco brand of imported "Premium" grade casein is tested to high quality standards to provide a dependable source of supply. Cyanamid also provides both English and domestic china clays, Satin White, Blanc Fixe, formaldehyde and various casein solvents.

(Below) WHEN MR. AND MRS. PUBLIC who are waiting for post war automobiles, get their new cars, they will be getting "extra value" in the "paint job." New synthetic resins have been developed to do this job—the resulting finishes bake faster and yet are harder, more scratch-resistant, and have longer life. Cyanamid's REZYL® resins and MELMAC® resins have been especially formulated for such superior auto finishes.



(Above) NATURAL DEFOLIATION of deciduous plants takes place when the leaves reach maturity. The plant grows an abscission layer across the juncture of the leaf petiole and the plant stem and the leaf falls. Chemical defoliation with a dust such as Cyanamid's AERO DEFOLIANT\*\*, does a better, cleaner, and quicker job than nature to speed and simplify harvesting and improve crop quality. Defoliation of cotton (right) eliminates dry leaves which slow cleaning processes and green leaves that stain fibers, stops boll rot, and facilitates hand or machine harvesting. Chemical defoliation of soybean plants (left, before frost; center, dusted with defoliant; right, killed by frost) assures earlier, less expensive harvesting, better crop rotation, and higher market value.

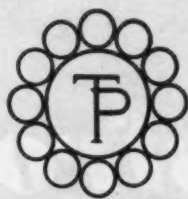
\*\*Reg. U. S. Pat. Off. \*\*Trade-mark

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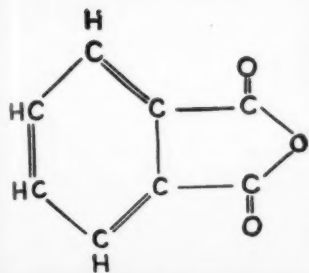
Eimer and Amend maintains large and comprehensive shelf stocks of chemical reagents and standardized solutions, prepared especially for analytical, testing and experimental work.

These reagents are produced in E.&A.'s manufacturing plant at Edgewater, N. J., and in its laboratories at Greenwich Street, New York.

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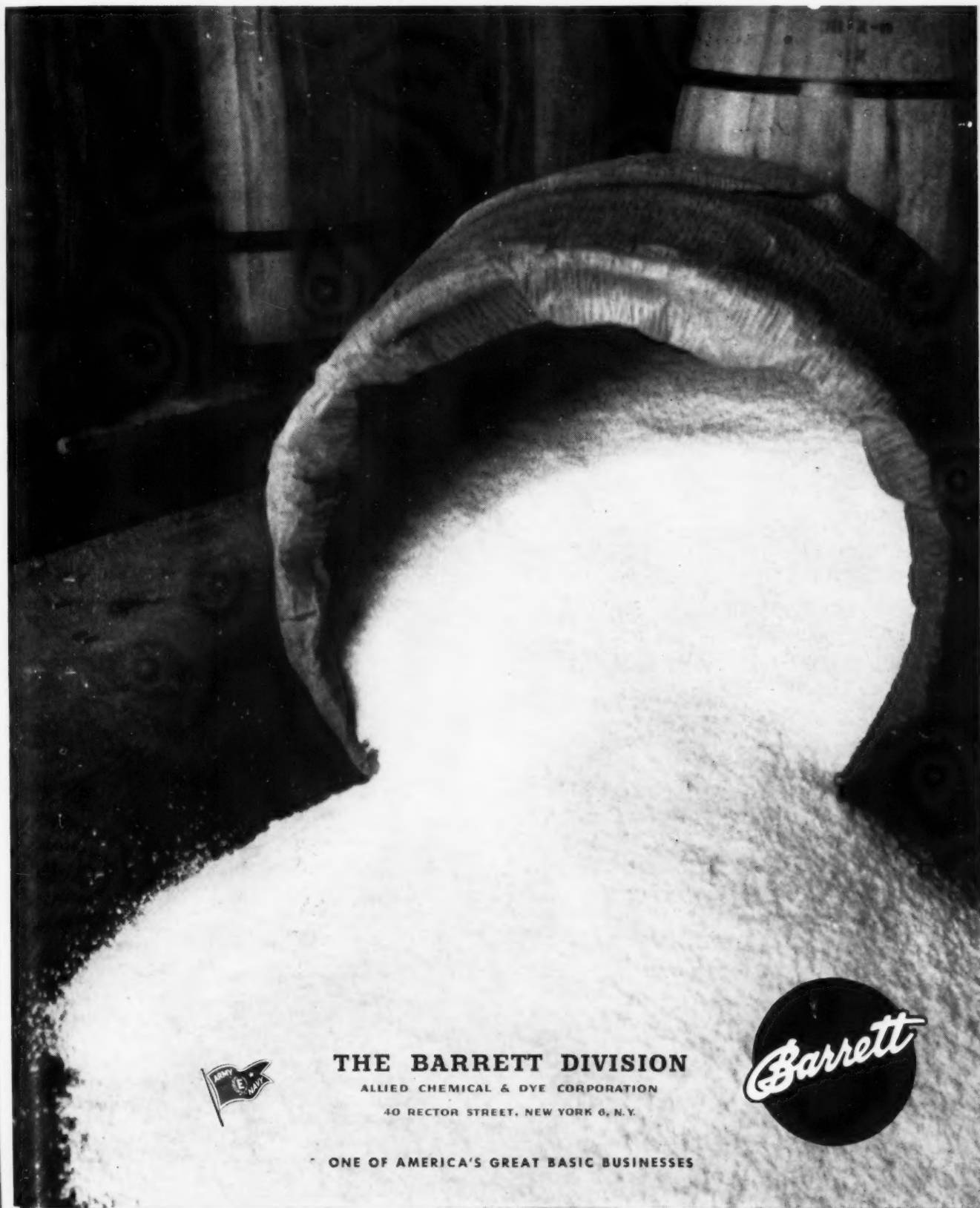
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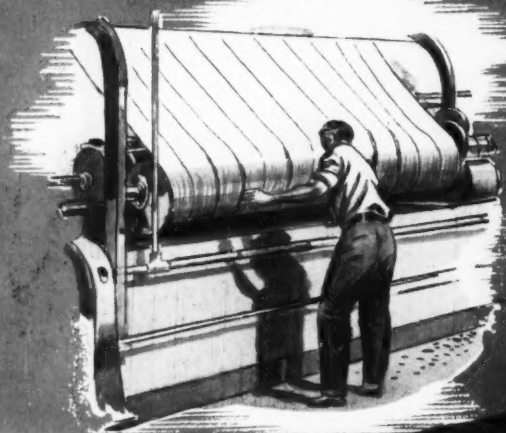
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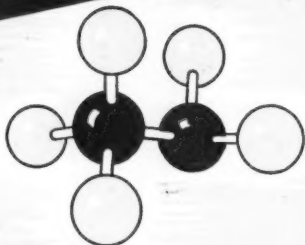
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### Monomethylamine



This amine has proven its usefulness in the manufacture of explosives, photographic chemicals, dyes, and textile specialties, and in certain classes of pharmaceuticals. The value of Monomethylamine as a raw material in various syntheses has been recognized, and this product warrants further investigation.

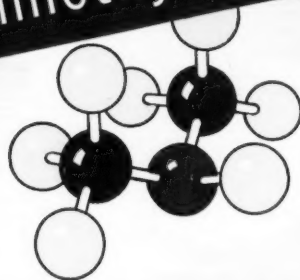
#### PROPERTIES

Molecular weight: 31.06  
Boiling point:  $-6.0^{\circ}\text{C}$  to  $-5.5^{\circ}\text{C}$  at 768 mm Hg  
Specific gravity: 0.699 at  $-10.8^{\circ}\text{C}/15^{\circ}\text{C}$   
Solubility: Very soluble in water and in alcohol. Also in ether. At  $25^{\circ}\text{C}$  water will dissolve 959 times its volume of Monomethylamine.  
Flash point (30% solution): Approx.  $0.3^{\circ}\text{C}$  ( $32.5^{\circ}\text{F}$ )  
Weight per U. S. Gallon (30% solution): Approx. 7.7 lb at  $68^{\circ}\text{F}$   
(Monomethylamine is supplied only in a 30-30.5% aqueous solution)

## RUBBER CHEMICALS



### Dimethylamine



Present uses of CSC Dimethylamine include applications in the manufacture of rubber accelerators, rubber latices and emulsions, and in the production of certain dyes, flotation agents, gasoline stabilizers, soaps, cleaning compounds, disinfectants, and germicides. Experimental quantities may be obtained on request.

#### PROPERTIES

Molecular weight: 45.08  
Boiling point:  $7.2^{\circ}\text{C}$  to  $7.3^{\circ}\text{C}$  at 764 mm Hg  
Specific gravity: 0.6865 at  $-6^{\circ}\text{C}$   
Solubility: Soluble in water, alcohol, ether, and many organic liquids.  
Flash point (25% solution): Approx.  $-6.25^{\circ}\text{C}$  ( $20.8^{\circ}\text{F}$ )  
Weight per U. S. Gallon (25% solution): Approx. 7.8 lb at  $68^{\circ}\text{F}$   
(Dimethylamine is supplied only in 25-25.5% aqueous solution)



## EXPLOSIVES

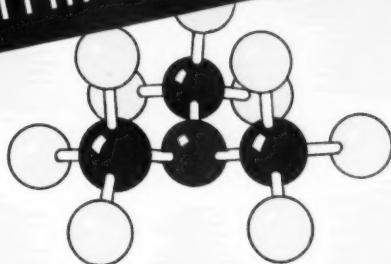


## GERMICIDES

## CHEMICAL SYNTHESSES



## Trimethylamine



Because of its characteristically pungent, ammoniacal odor, CSC Trimethylamine can be used as an attractant in insecticides. It has been suggested as a warning agent in confined gases. Trimethylamine is used in various chemical syntheses. This product is now available.

### PROPERTIES

Molecular weight: 59.11

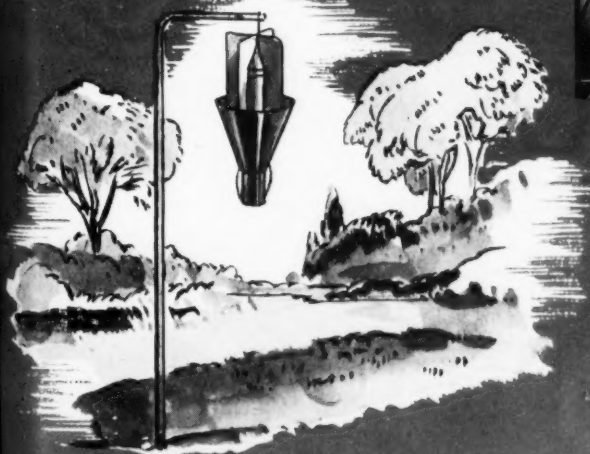
Boiling point: 3.2 C to 3.8 C at 765 mm Hg

Specific gravity: 0.662 at -5 C

Solubility: Very soluble in water. One liter of aqueous saturated solution at 19 C contains 410 grams of Trimethylamine

Flash point (25% solution): Below 5.55 C (42 F)

Weight per U. S. Gallon (25% solution): Approx. 7.8 lb at 68 F  
(Trimethylamine is supplied only in 25% aqueous solution)



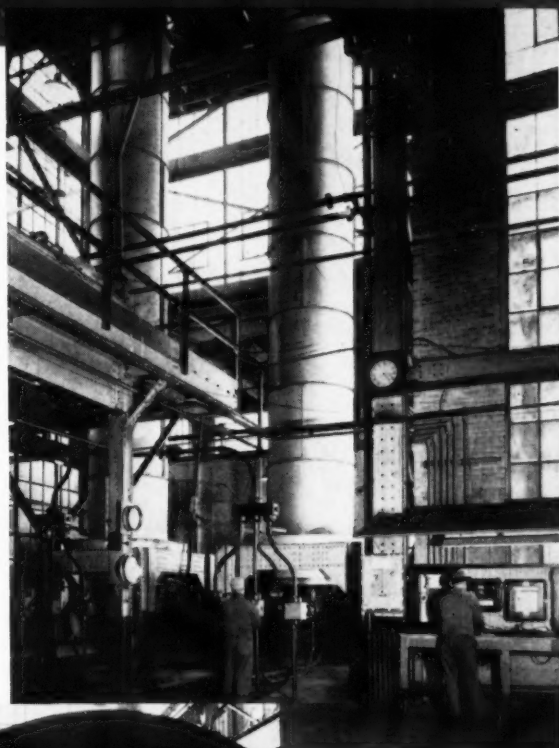
## INSECT ATTRACTANT

## CSC AMINES

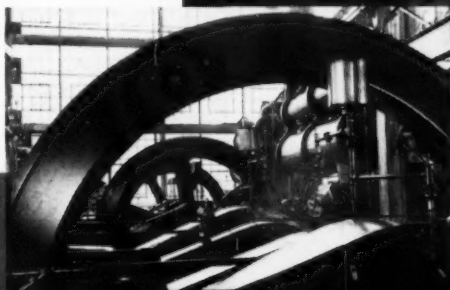
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- Tri(hydroxymethyl)aminomethane

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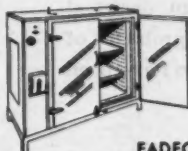
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The UBS Laboratories are only one of many American industrial research groups busy with synthetic latex, compounding problems. But we have made some valuable contributions to the general fund of knowledge in this important field, including the development of several original bases. And we're constantly conducting tests to improve ageing qualities for particular applications, employing the testing methods best suited to the application for which the compound is to be used. For ex-

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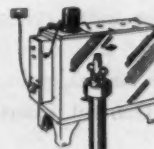
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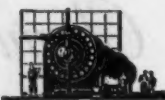
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# SILICATES OF SODA



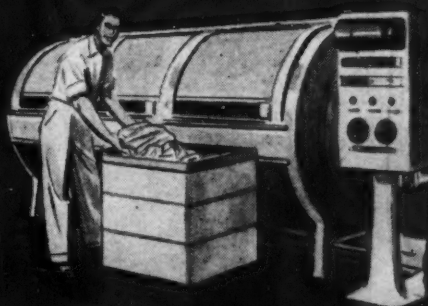
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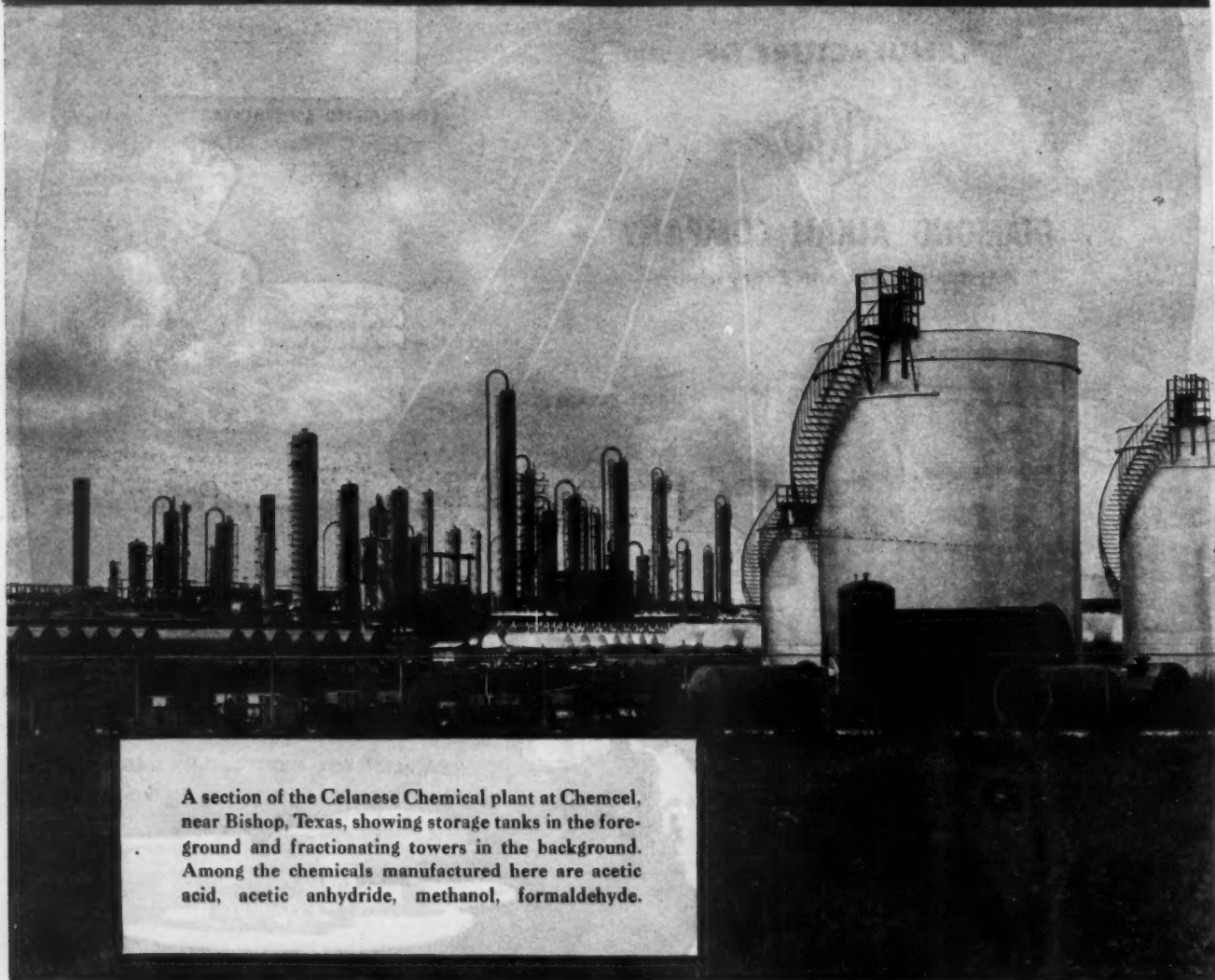
TEXTILES

Standard Silicates are known throughout industry for uniformly high quality. Some of the uses prominently shown here.

SPECIALIST FOR HIGH OCTANE GASOLINE



# Celanese Chemicals



A section of the Celanese Chemical plant at Chemcel, near Bishop, Texas, showing storage tanks in the foreground and fractionating towers in the background. Among the chemicals manufactured here are acetic acid, acetic anhydride, methanol, formaldehyde.

**CELANESE CORPORATION OF AMERICA**

# EXPANDED PRODUCTION...

## Keyed to Individual Objectives

THE GREATLY expanded production of Celanese Chemicals—the modern plant now operating at Chemcel, near Bishop, Texas—is a milestone in the progress of Celanese research.

The plant will contribute important new volume to the field of organic chemicals. Production will include such standard chemicals as acetaldehyde, acetic acid, acetic anhydride, acetone, formaldehyde, methanol, and butadiene.

Located near major sources of natural gas, this Celanese plant has facilities for developing many new organic chemicals to satisfy a wide variety of industrial

requirements in many diversified fields.

But an added significance is the greater opportunity afforded Celanese research to assist chemical engineers in reaching advanced and highly specialized objectives.

Meeting new chemical goals with precision—anticipating vitally needed chemical properties are inherent in organic research. And these objec-

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*Velsicol AD-6-3 is available in solid and solution forms*



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SINCE 1885

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While Stauffer serves every industry, manufacturers of synthetic, reclaimed or natural rubber are well acquainted with the dependable quality of Stauffer Chemicals.

Such products as rubbermakers sulphurs have been supplied since the turn of the century. Other products consumed in rubbermaking such as sulphur chloride, caustic soda, carbon bisulphide and carbon tetrachloride have also found wide use in rubbermaking. In addition, Stauffer's development of Crystex insoluble sulphur proved of unusual interest—an amorphous sulphur that prevents bloom in uncured rubber stocks and other important uses.

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Caustic Soda	Sodium Hydrosulphide	Tartaric Acid
Cream of Tartar	Stripper, Textile	Titanium Tetrachloride
Chlorine		

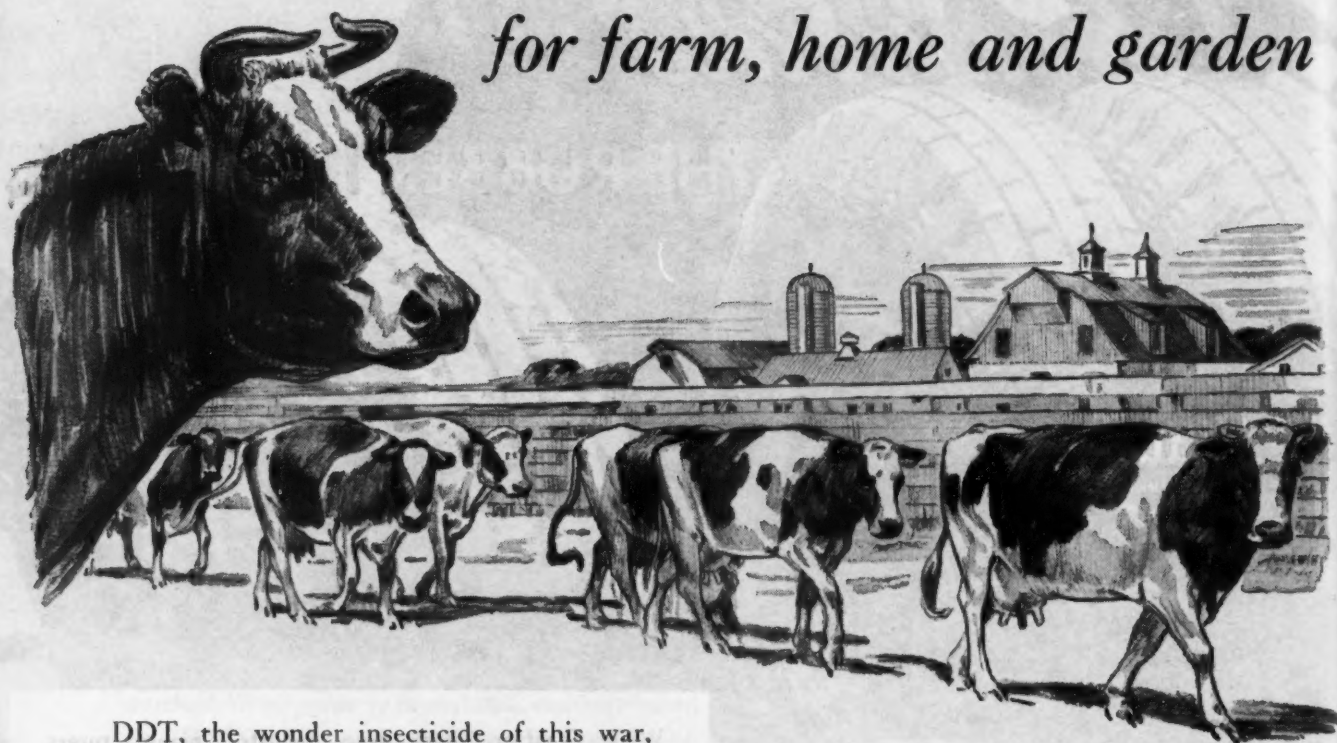
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DDT, the wonder insecticide of this war, has had a tremendous "press." Nearly every civilian is eager to try DDT in his home, in his garden, or, if he is a farmer, on his crops and farm animals.

DDT by itself will not dissolve in water. To make DDT an insecticide spray for civilian use, it is often desirable to use solubilizing and emulsifying agents. DDT is dissolved by organic solvents to make what is known as concentrates. These will not dissolve in water, so surface active agents, such as Atlas Spans and Tweens are mixed with these concentrates to make them water-dispersible.

The surface active agents used to make DDT sprays must be versatile. The sprays are used under a wide variety of conditions—with many different solvents, with all kinds of hard or soft water, and in cold weather or hot.

Atlas Spans and Tweens have filled those requirements neatly. Because they are chemi-

cally complex materials, they are able to provide the entire transition from completely oil soluble to completely water soluble. They offer stability in the presence of acids and electrolytes, and an exceptionally wide range of compatibilities.

Atlas Spans and Tweens are versatile materials upon which you can build. We will be glad to help technically. As a starter, write for a free copy of the 20-page booklet illustrated below.

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Atlas Spans constitute a series of technical long chain fatty acid partial esters of hexitol anhydrides. The hexitol anhydrides include sorbitans and sorbides, mannitans and mannides.

Atlas Tweens comprise a series of polyoxyalkylene derivatives of hexitol anhydride partial long chain fatty acid esters.



Spans and Tweens: Reg. U.S. Pat. Off.

# ATLAS

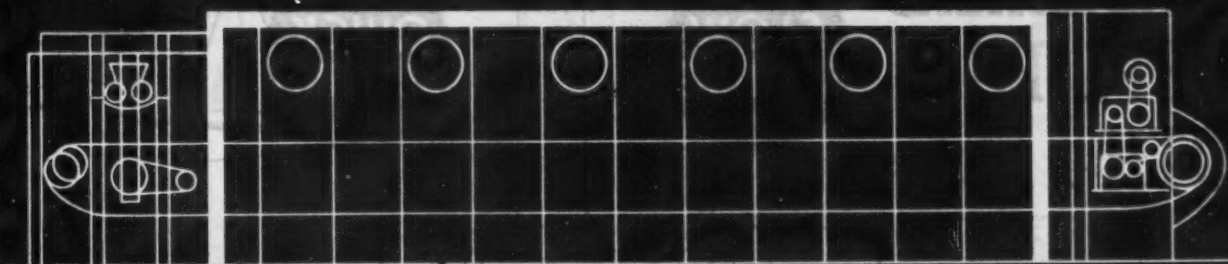
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These materials are merely indicative of the general type that can be efficiently dried in the Proctor Aero-Form Dryer with the Rolling Extruder Feed. Most materials, that have physical characteristics permitting the holding of a definite shape after extrusion, can be handled equally well in this general type Proctor continuous dryer. After being filtered or otherwise mechanically dewatered, material is delivered to the oscillating hopper which forms part of the feeding mechanism of dryer. By means of rollers the material is pressed through perforations in the plate at the base of hopper and discharged to moving conveyor which carries product through drying chambers. Being loaded to uniform depth on constantly moving conveyor, the material is dried uniformly and thoroughly all the way through. Case hardening is eliminated; drying is speeded and production is materially increased over less recent methods of drying. This method of pre-forming and drying is one more result of Proctor research. Before any Proctor

### HOW EXTRUSION IMPROVES DRYING

Material at left is before extrusion. Pre-forming "sticks" permits continuous conveyor drying; circulation of heated air through bed of material on moving conveyor promotes uniform drying and eliminates case hardening; speeds drying and increases production.

dryer is built, it is definitely determined in the laboratory that the design recommended is the one best suited to the product to be dried. If an existing design cannot be adapted to meet the needs of the product, the skill and ingenuity of Proctor engineers is poured into creating a new machine design to meet those plant or production requirements. If you have a drying problem—you'll profit by placing it in the hands of Proctor engineers without delay!

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SETTLING



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Whether you require a fast settling lime or one which remains long in suspension, there is a Marblehead product to speed and improve your operations. Marblehead Chemical

Lime analyzes approximately 98% pure calcium and is comparatively free from foreign matter. Thus it furnishes maximum chemical activity per dollar of cost.

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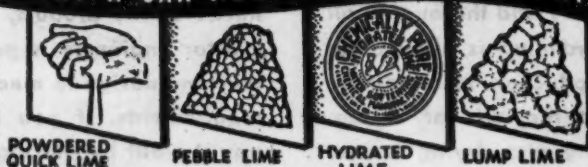
industrial need . . . *Pulverized Quicklime*, unslaked, thoroughly calcined and milled to a very fine powder . . . *Pebble Lime*, quick slaking, uniform size for easy handling . . .

*Lump Lime*, clean and pure, high in quality and activity . . . *Hydrated Lime*, an impalpable powder, ideal for water softening and general use.

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# ATTACK CORROSION

## ACE HARD RUBBER AND PREVENT LOSS OF TIME

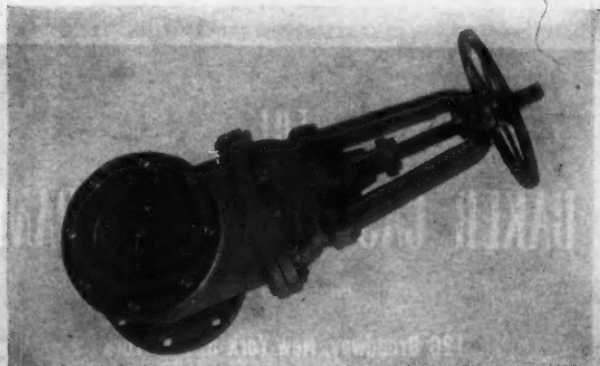
### WEAPON NO. 1: ACE HARD RUBBER

The hidden, ever-present saboteur in your plant, against whom you must continuously wage war, is corrosion. Slowly, relentlessly corrosion works away at the very vitals and arteries of your storage and circulatory systems.

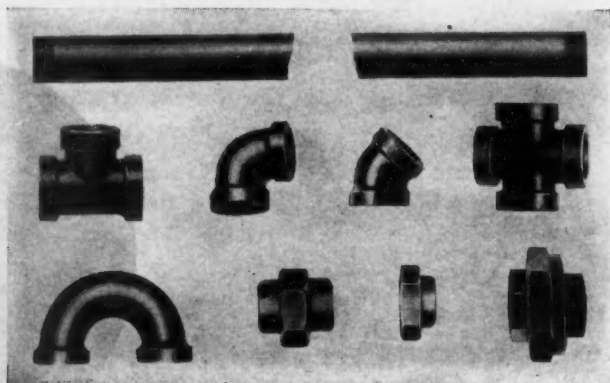
Happily, there is a positive weapon against corrosion—Ace Hard Rubber. It meets and defeats corrosion on every

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Gate, diaphragm and check valves with fully bonded hard rubber linings over all inner surfaces.



Ace Hard Rubber threaded pipe fittings, tees, elbows, crosses in  $\frac{1}{4}$ " to 6" sizes. Return bends, couplings, unions and caps in  $\frac{1}{4}$ " to 4" sizes.

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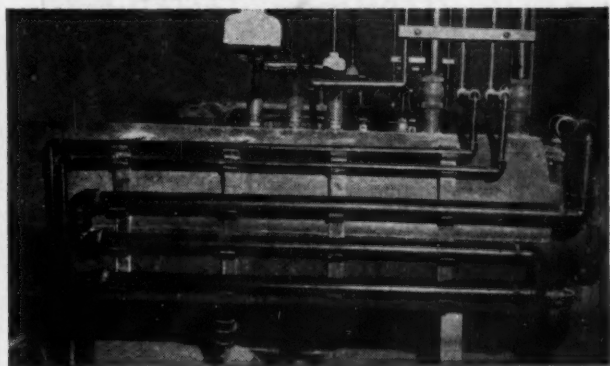
### **WEAPON NO. 2: ACE SARAN**

Ace Saran is another weapon in your fight against corrosion. For this modern, versatile plastic has a remarkable resistance to many rubber solvents and most active chemicals.

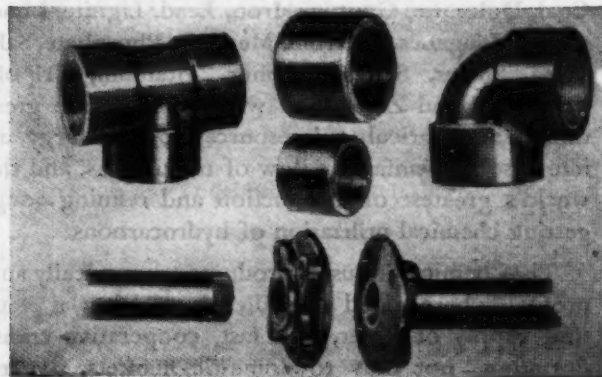
Saran pipe and threaded fittings are now available in standard iron pipe sizes: the pipe from  $\frac{1}{4}$ " to 2", the fittings from  $\frac{1}{2}$ " to 4". A simple butt-welding operation

makes it possible to assemble long Saran pipe lines on the job without the use of threaded fittings, when desirable.

You will want to know more about the possible use of Saran in your plant. We will be glad to send you a circular which contains information that should be instantly available in every plant where there are chemical processing operations. Our engineers will be glad to cooperate with you in helping solve your anti-corrosion problems and in designing equipment for economical operation.



Saran's insulation value, corrosion resistance, long life and ease of installation make it a valuable material in many plant departments.



Ace Saran is available in pipe and fittings which can be adapted for many applications. Notable for its inertness in contact with almost all active chemicals. Ask us to mail Saran circulars.

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# Basic Materials

## FOR CHEMICAL MIRACLES

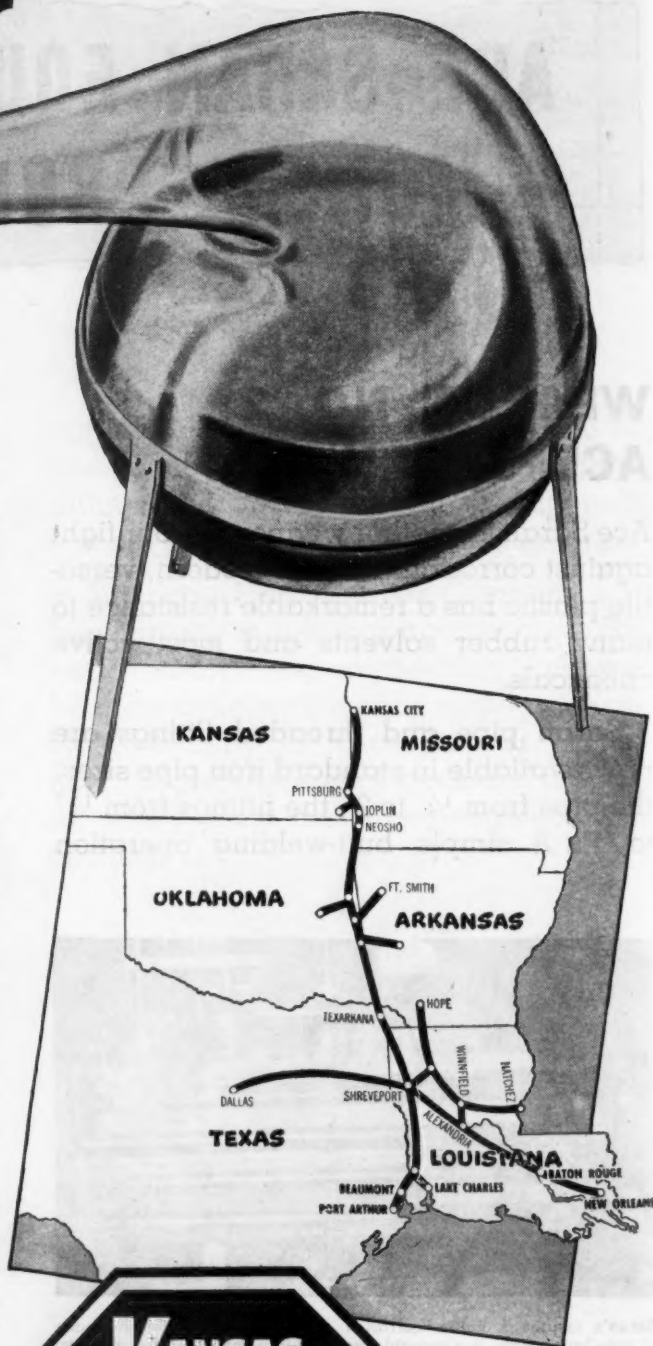
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"Acheson" graphite anodes. It is part of what we call "customer service"—one of the five essential things you never see in "Acheson" anodes. The others: selection of raw materials, manufacturing experience, manufacturing control, and continuing research.

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Propylamine	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$	59.1	46-51	0.717	1.389	<20
Isopropylamine	$(\text{CH}_3)_2\text{CHNH}_2$	59.1	31-35	0.687	1.376	<20
Dipropylamine	$(\text{CH}_3\text{CH}_2\text{CH}_2)_2\text{NH}$	101.2	105-110	0.740	1.405	45
Diisopropylamine	$[(\text{CH}_3)_2\text{CH}]_2\text{NH}$	101.2	80-85	0.718	1.395	20

Sharples Chemicals Inc.



PHILADELPHIA • CHICAGO • NEW YORK

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PENTALARM* (AMYL MERCAPTAN)	VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)	
AMYLAMINE	ETHYLAMINE
DIAMYLAMINE	DIETHYLAMINE
TRIAMYLAMINE	TRIETHYLAMINE
DIETHYLAMINOETHANOL	BUTYLAMINE
ETHYL MONOETHANOLAMINE	DIBUTYLAMINE
ETHYL DIETHANOLAMINE	TRIBUTYLAMINE
MIXED ETHYL ETHANOLAMINES	TETRAETHYLTHIURAM DISULFIDE
DIBUTYLAMINOETHANOL	TETRAETHYLTHIURAM MONOSULFIDE
BUTYL MONOETHANOLAMINE	TETRAMETHYLTHIURAM DISULFIDE
BUTYL DIETHANOLAMINE	ZINC DIETHYLDITHIOCARBAMATE
MIXED BUTYL ETHANOLAMINES	ZINC DIMETHYLDITHIOCARBAMATE
AMYL CHLORIDES	ZINC DIBUTYLDITHIOCARBAMATE
DICHLORO PENTANES	CUPRIC DIETHYLDITHIOCARBAMATE
	SELENIUM DIETHYLDITHIOCARBAMATE
	o-AMYL PHENOL
	MIXED AMYLENES
	DIAMYL PHENOL
	AMYL SULFIDE
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PLANT: WYANDOTTE, MICH.

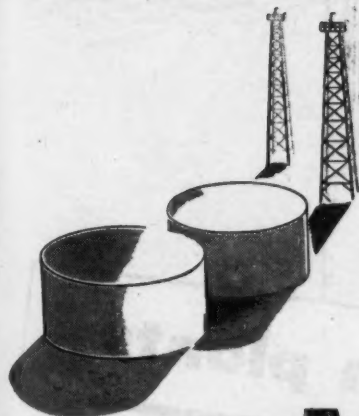
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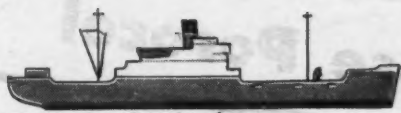
WORLD'S LARGEST PRODUCER OF SYNTHETIC RESINS



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improve corrosion resistance



USE  
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War has proved that all metal construction can be better protected with RCI Zinc Yellow—now available for all peacetime projects! And not only does it give better corrosion resistance—it saves tons of dead-weight compared to other anti-corrosion pigments.

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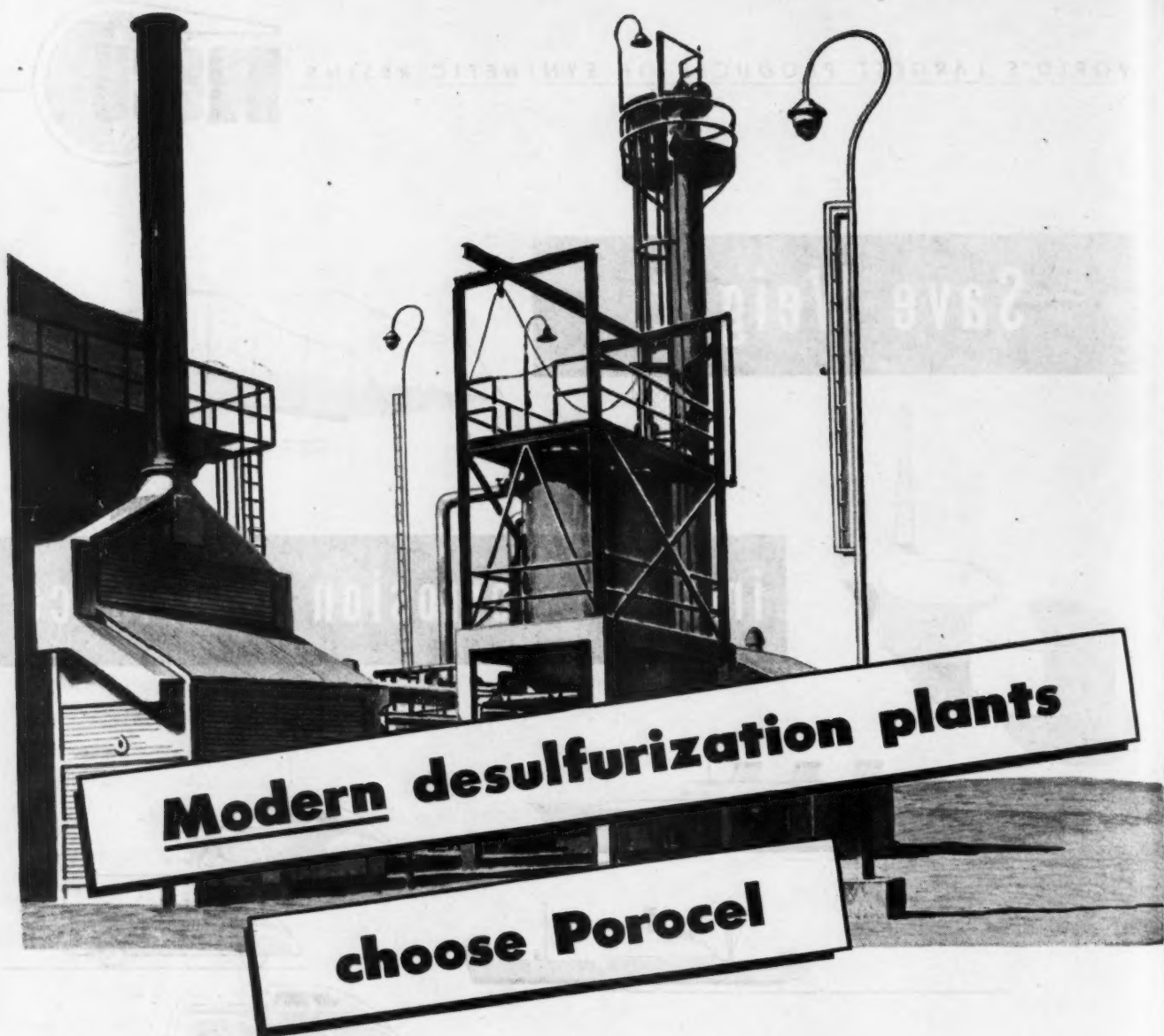


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As a refiner seeking to improve processes that require solid agents, you have probably tested many catalytic materials. Why not let Porocel prove its superiority in similar tests? We shall be glad to send generous samples and detailed information. There's no obligation, of course. Write

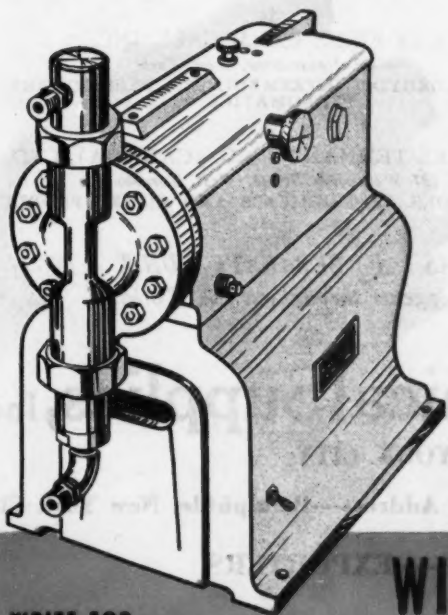
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**POROCEL CORPORATION • BAUXITE ADSORBENTS AND CATALYSTS**

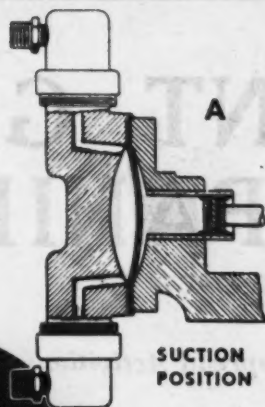
**WILSON  
PULSAFEEDERS**  
are known by the  
companies they keep in  
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Above diagram of suction and discharge position are exaggerated to indicate more clearly the principle of operation. Actually the diaphragm-travel is barely perceptible.

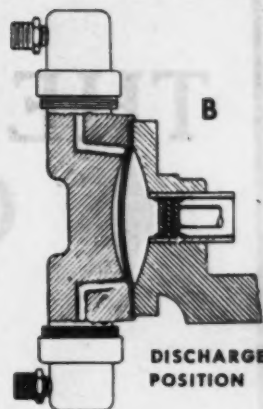
Wilson Pulsafeeders are made in both high and low pressure models, up to 20,000 pounds per square inch. Capacities range from a few c.c.p.h. to 1000 g.p.h. Accuracies up to  $\frac{1}{2}$  of 1% are obtainable where required. Models are available for the COMPRESSION OF GAS.



WRITE FOR  
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Exclusively in this proportioning pump, the piston reciprocates a liquid medium interposed between the diaphragm and piston. This causes the diaphragm to react positively to every change in piston position. Diaphragm-life, from a mechanical point of view, is infinite; and leak-likely packing glands are no part of our construction!



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**Assures accuracy and dependability to all  
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*Persisting accuracy* is the outstanding quality in Wilson Pulsafeeders. It is *the* reason why technicians all over the world so generally specify these chemical proportioning pumps for their new installations as well as for modernizing replacements.

Special significance lies in the fact that Wilson Pulsafeeders are chosen exclusively for so many remote placements where need for frequent servicing cannot be tolerated, and where results must satisfy despite the handicaps of distance, inexperienced personnel, make-shift power supply and comparable difficulties.

In Wilson Pulsafeeders, load liquids are isolated from working parts. Lubrication is sealed in. Valves are designed for specific service. Balanced diaphragms (see sketches above) assure accuracy and are not subject to rupture regardless of operating pressures. Micrometer adjustment of stroke, according to calibration charts furnished, may be made while Pulsafeeders are in operation.

May we send our general folder for your files or, better still, specific information as it may apply to an immediate problem? We also manufacture liquid filling machines and dry chemical feeders. Do write us today.

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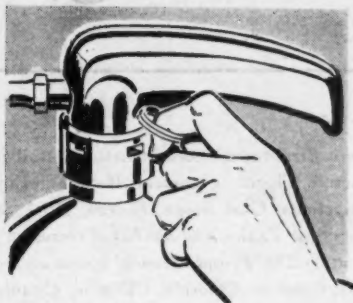
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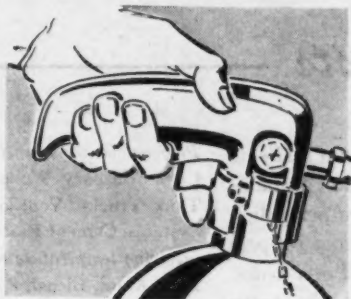
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# Here's the HOW... and the WHY of TRIGGER-FINGER CONTROL

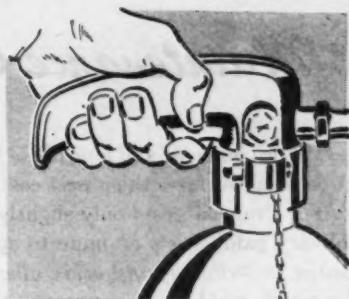
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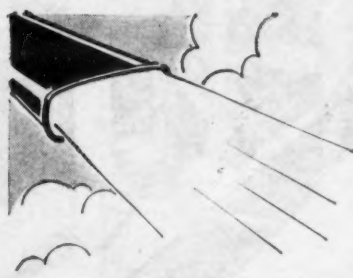
- 1.** Pull out non-jamming locking pin. Seating in two blind holes, it can't be turned... the ends cannot get bent over.



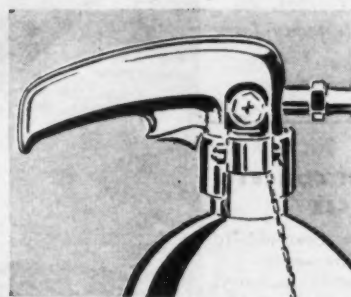
- 2.** Pick up easy-to-carry extinguisher. Balanced design and low center of gravity make carrying job simpler.



- 3.** Press the trigger. That's the simple, *natural* way to operate extinguisher — one finger does the trick.



- 4.** Get full flow at once. No half-way measures with this fast-starting valve... carbon dioxide goes right to work!



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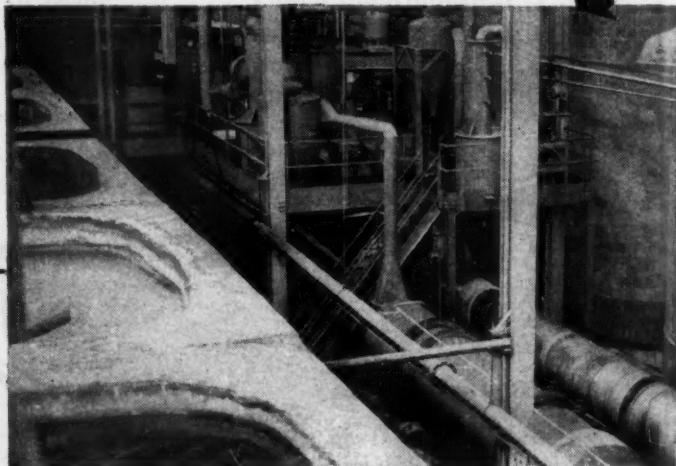
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**L**OW original cost and long life of Prufcoat make its application on all surfaces the lowest cost method of maintenance. For Prufcoat costs only slightly more per gallon than ordinary paint, costs no more to apply, and yet provides positive protection against acids, alkalis, oil and water. Thus, longer life and less frequent repaint jobs make maintenance savings certain.

Proved in hundreds of America's largest industrial plants during the past five years\*, Prufcoat is being used today not only in areas where corrosion is severe, but on all structural steel and concrete, inside and outside. For Prufcoat cuts maintenance costs whether the corrosion problem is mild or severe.

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Prufcoat is in use on Concrete Structures, Steel Structures, Railway Tank Cars, Masonry Walls, Concrete Floors, Chemical Handling Equipment, Tank Trucks, Ventilating Systems, Cast Stone, Stucco, Brick, Sprinkler Systems, Cement Blocks, Chemical Tanks, and has licked corrosion problems involving temperature ranges up to 230° F. and chemical agents such as Acetic Acid, Alum, Bleach Solutions, Calcium Chloride, Chlorine, Cyanides, Formaldehyde, Flue Gases, Hydrofluoric Acid, Lactic Acid, Mineral Oils, Muriatic Acid, Nitric Acid, Oleic Acid, Oleum, Phosphoric Acid, Salt Solutions, Sodium Hydroxide, Steam, Sugar, Sulfonated Oils, Sulfuric Acid, Tri-Sodium Phosphate.



The Prufcoat film formed after Polymerization has virtually a zero acid number, saponification number and water absorption rate.

vehicle is crystal clear and contains no drying oils, wax, stearates or bitumen. Plasticity can be controlled from permanent tackiness to brittleness, as desired. Available in a variety of standard colors, making possible identification of lines and other equipment by color.

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A-19

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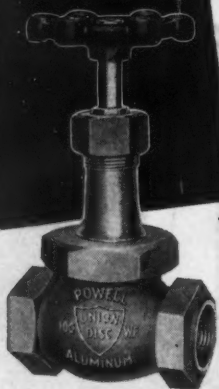


Fig. 1853 — Aluminum Globe Valve with screwed ends, union bonnet, and renewable vulcanized composition disc. Can be supplied with 18-8S stem.

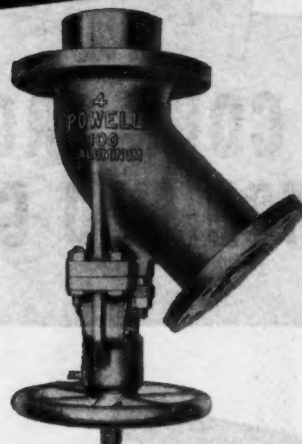


Fig. 2309A—Aluminum Flush Bottom Tank Valve for attaching to metal tanks and autoclaves. Also available with 18-8S disc, stem and seat plate. In this design the disc rises into the tank to open the valve.

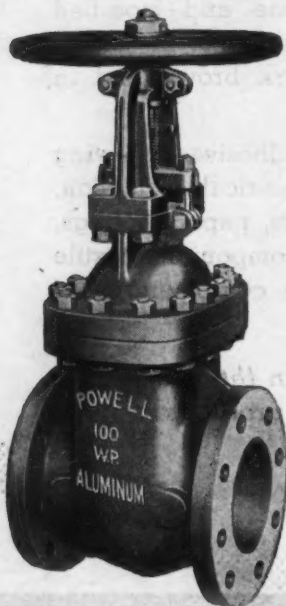


Fig. 2461—Large size Aluminum Gate Valve with flanged ends, bolted flanged bonnet, outside screw rising stem and taper wedge double disc. Can be supplied with 18-8S disc and stem.



Fig. 1859—Aluminum Gate Valve. Screwed ends, screwed-in bonnet, inside screw rising stem and taper wedge double disc. For more severe service, we recommend 18-8S disc and stem.

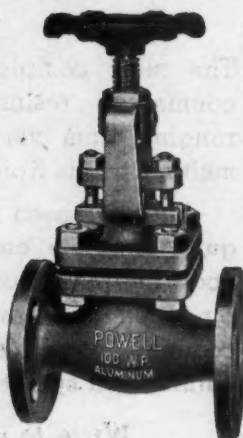


Fig. 1946 — Aluminum Gate Valve with flanged ends, bolted flanged bonnet, and outside screw rising stem. Taper wedge double disc in sizes 1" and larger. Also available with 18-8S disc and stem.

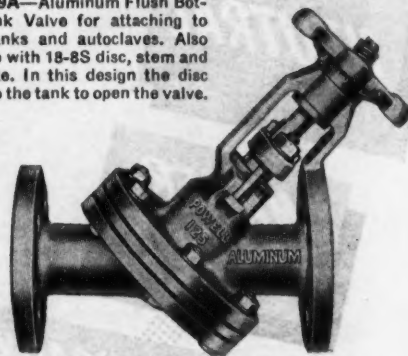


Fig. 1097A—Aluminum Separable Body Reversible Seat "Y" Valve. Also available with 18-8S disc, stem, lock nut, gland and seat plate. Lower half of the body can be unbolted and turned through an arc of 180 degrees to make a 90-degree angle valve, for special piping arrangement and to eliminate extra fittings.

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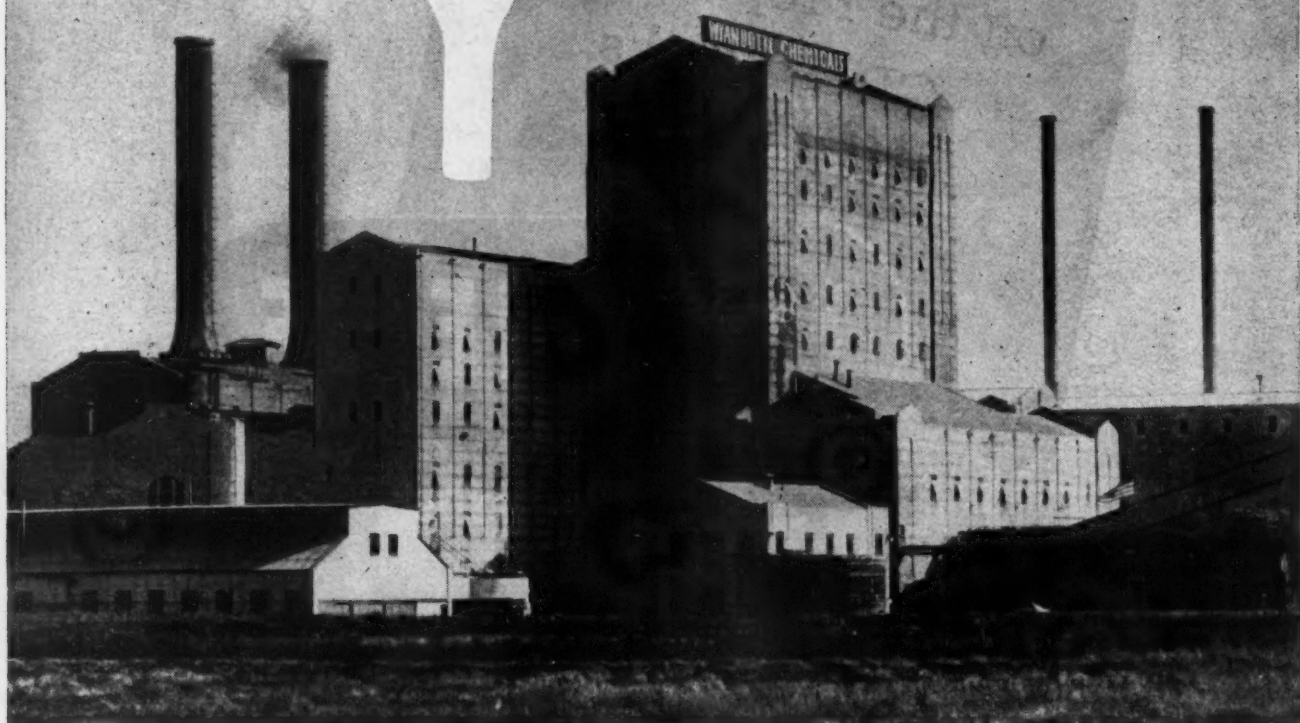
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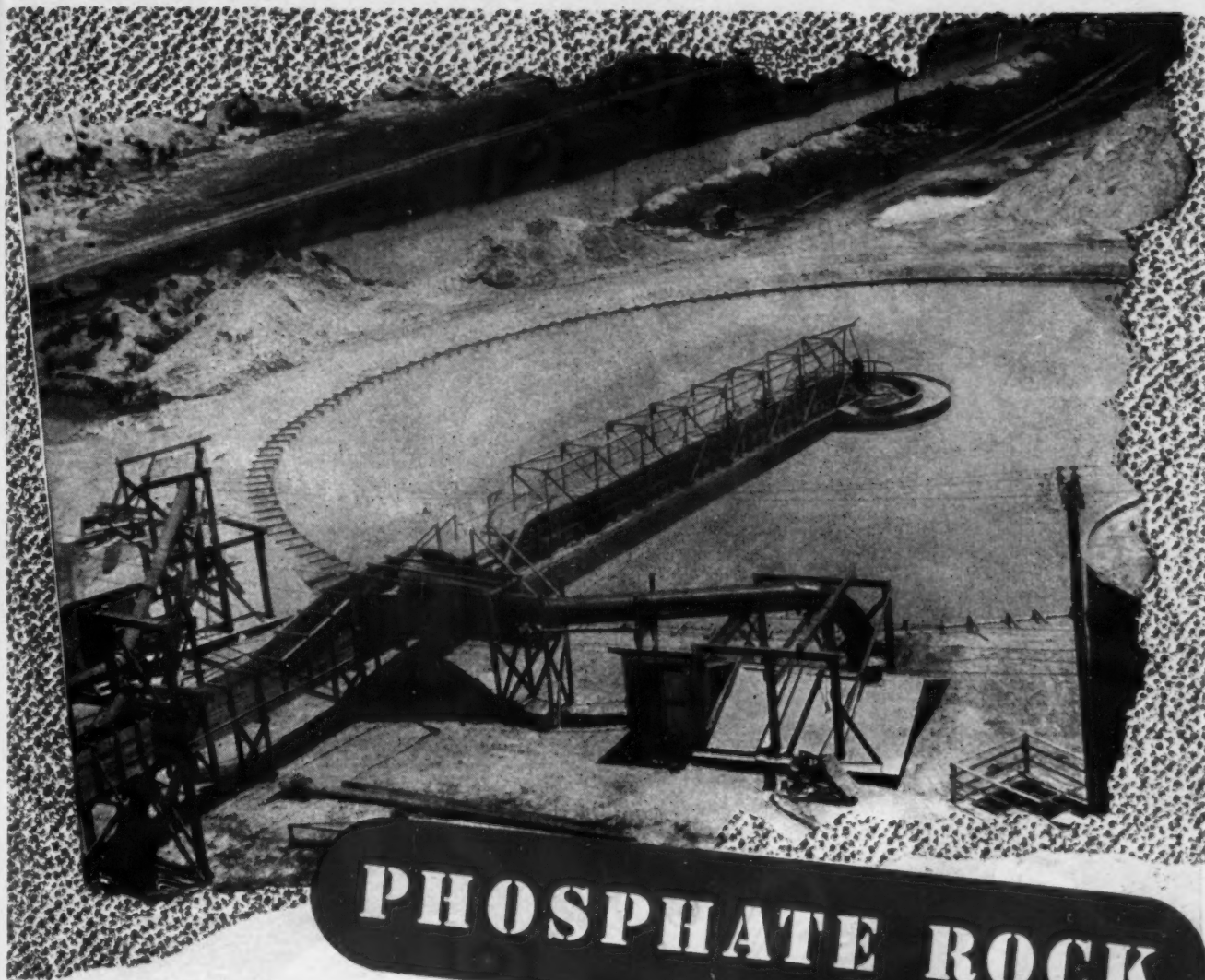
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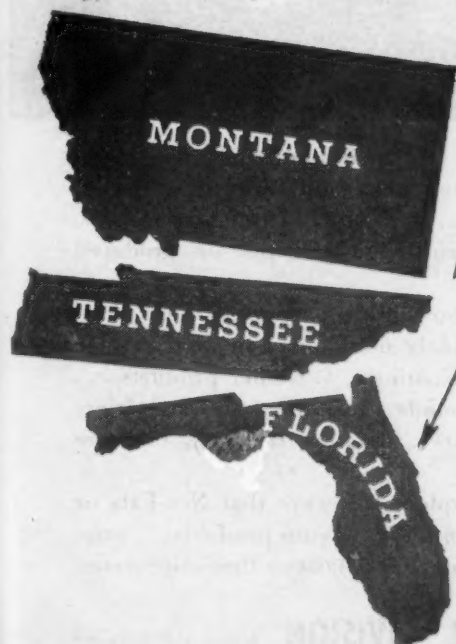
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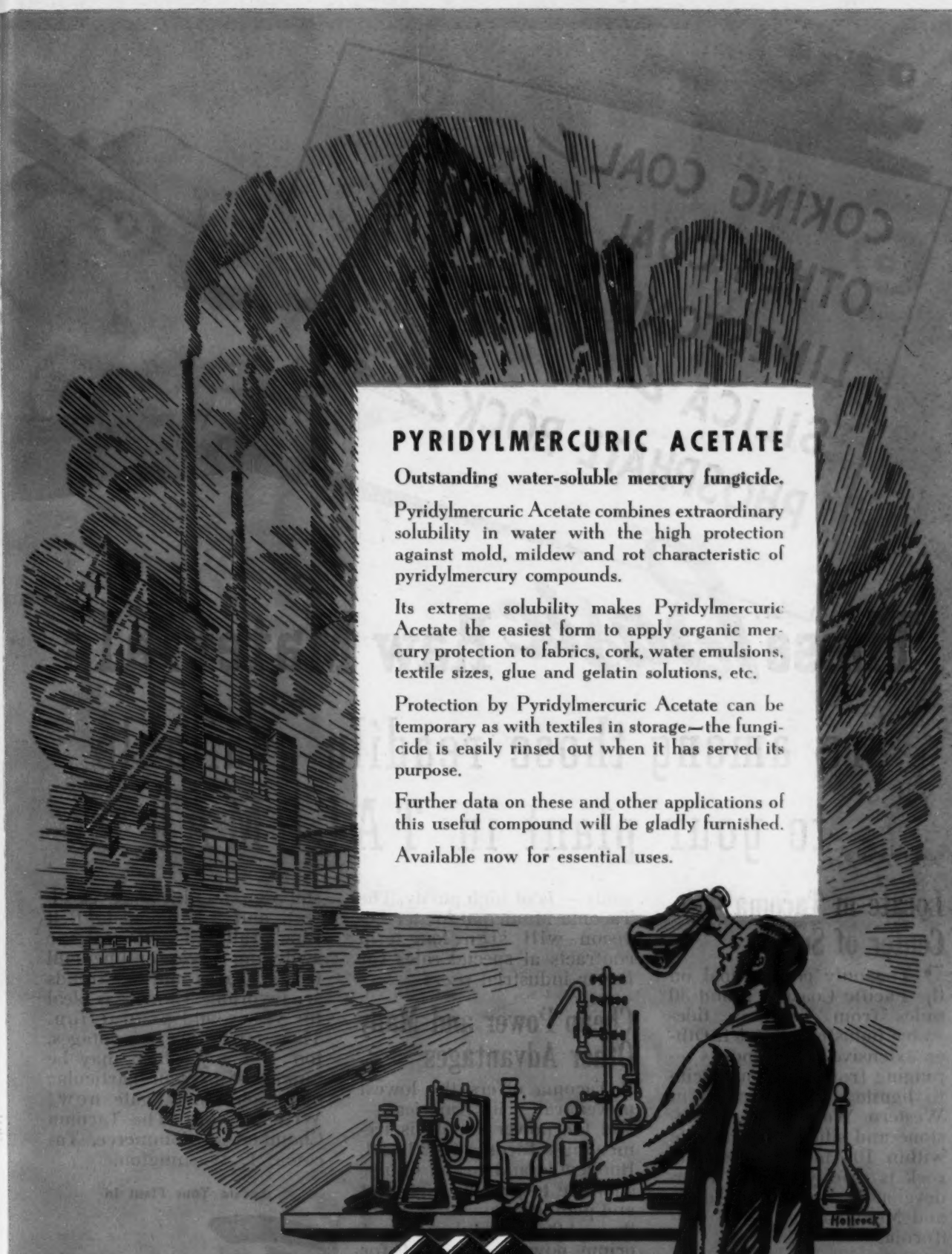
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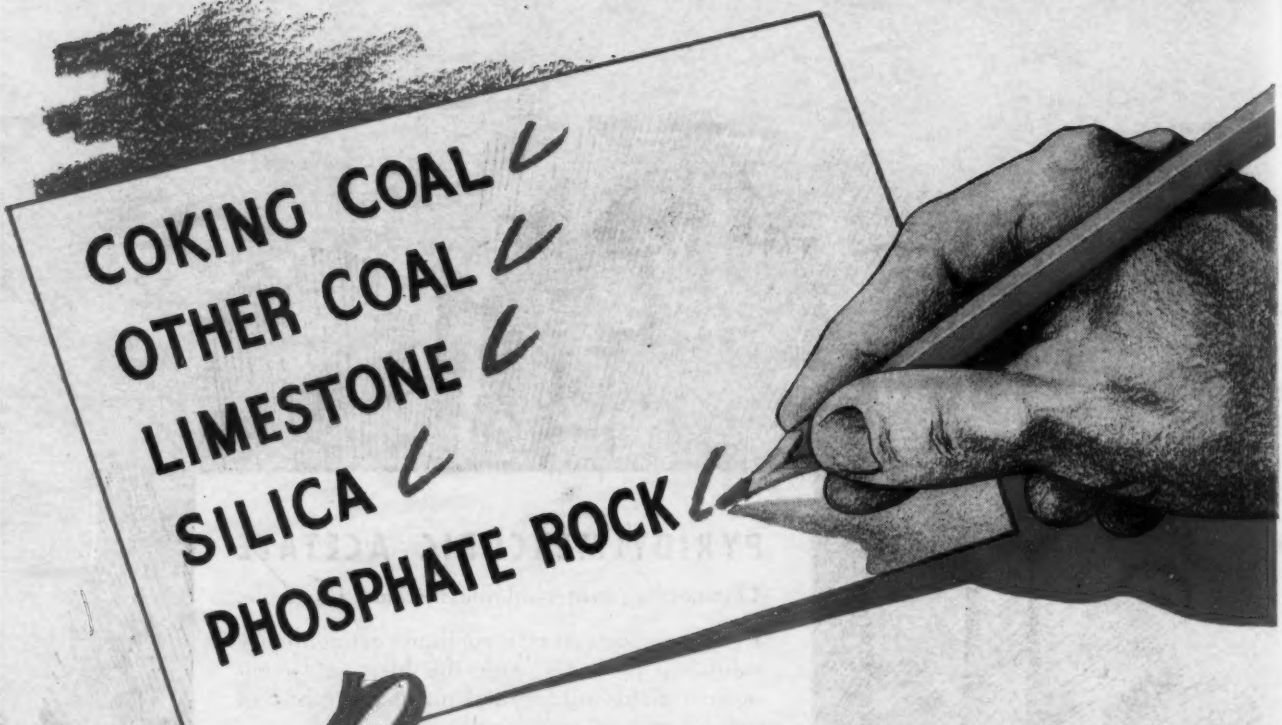
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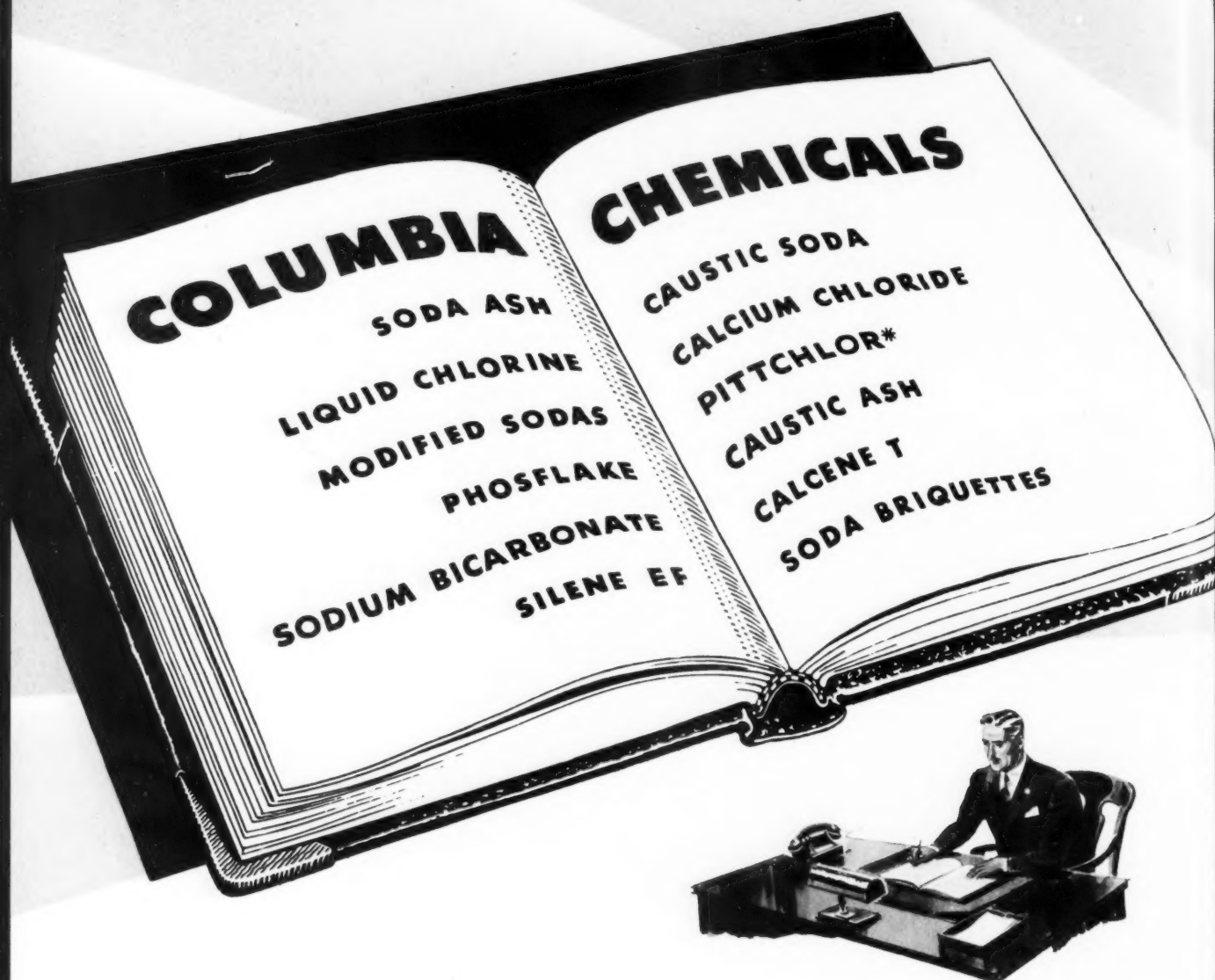
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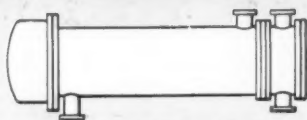
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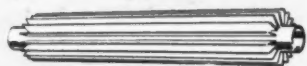
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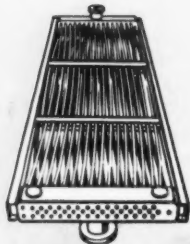
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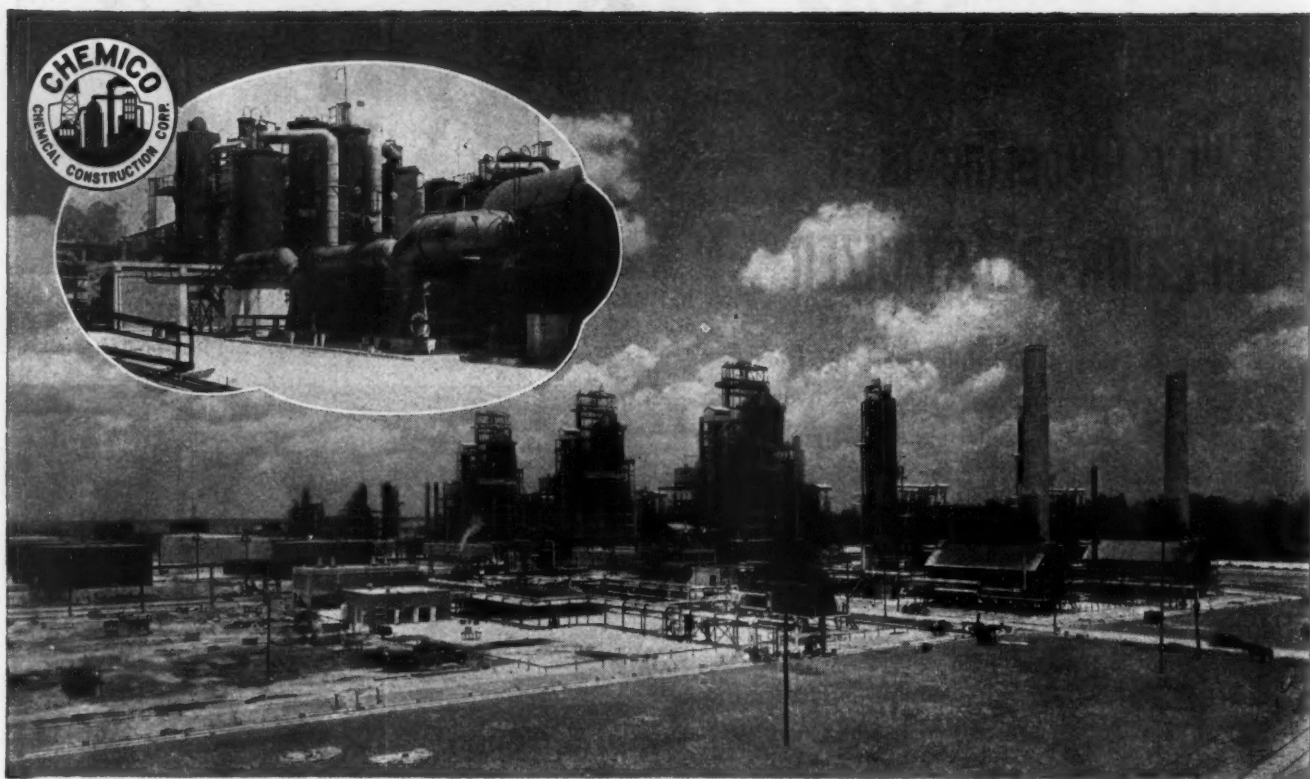
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The properties and characteristics of these compounds are so varied that they are serving industry in many different ways. Some of these uses are indicated. These uses plus the structural formulas may suggest other possible uses to you.

Data sheets giving more information and samples of these Chemicals are available when requested on your letterhead. Our Technical Staff is also at your service in helping you evaluate Hooker Chemicals for your specific needs.

## PRODUCT

*Chemical Formula*

*Molecular Weight*

**Monochlorobenzene**  
 $C_6H_5Cl$ ; 112.5

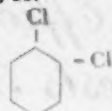


## DESCRIPTION & USE

Clear, colorless liquid. Boiling Range  $131.3^\circ$  to  $132.3^\circ C$ . Manufacture picric acid, phenol, dinitro chlorobenzene, intermediates for a variety of synthetic chemicals, sulfur black and brown dyes and other dyes, synthetic perfumes, pharmaceuticals; insecticides; solvent for removing paint and tars.

**Orthodichlorobenzene (Tech)**

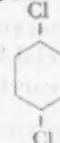
$C_6H_4Cl_2$ ; 147



Clear, colorless liquid. Boiling Range  $6^\circ$  including  $179^\circ C$ . Manufacture pyrocatechin, dye intermediates, other synthetic organic chemicals; degreasing metals; removing road tar from automobiles; ingredient metal polishes, paint and varnish removers; insecticide for termites, powder post beetles, sewage treatment.

**Paradichlorobenzene**

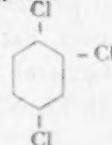
$C_6H_4Cl_2$ ; 147



White crystalline solid in 7 sizes. Insecticide for clothes moths and peach tree borers; deodorant; fungicide for tobacco blue mold and cranberry bog root grub. Manufacture of dye intermediates and other synthetic chemicals.

**Trichlorobenzene 1:2:4 (Tech)**

$C_6H_3Cl_3$ ; 181.5



Clear, colorless mobile liquid. Boiling Range  $205^\circ$  to  $235^\circ C$ . Manufacture dye intermediates and other organic chemicals, ingredient non-flammable electrical transformer fluids; as heat transfer medium; solvent for fats, oils, waxes, resins, for degreasing metals; insecticide especially as soil poison for termites.

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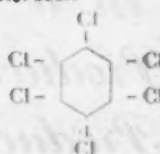
Lauryl Chloride is readily available in commercial quantities and samples will be supplied when requested on your letterhead. Technical Data Sheet 764 describes the physical properties of Lauryl Chloride and a copy is yours for the asking.

## PRODUCT

*Chemical Formula*

*Molecular Weight*

**Hexachlorobenzene**  
 $C_6Cl_6$ ; 284.7

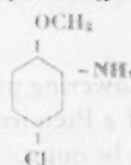


## DESCRIPTION & USE

White to cream colored, odorless, crystalline solid. Melting Range  $225^\circ$  to  $230^\circ C$ . Ingredient of pyrotechnic flares, wire drawing compounds.

**Chlor Anisidine**

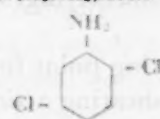
$NH_2 \cdot C_6H_3 \cdot Cl \cdot OCH_3$ ; 157.5



Gray crystalline solid, mixture of three isomers. Melting point  $79^\circ C$  min. Manufacture of dyes.

**2:5 Dichlor Aniline**

$Cl_2 C_6H_3 NH_2$ ; 162.0



Coarse brown crystals. Melting Range  $48^\circ$  to  $49^\circ C$ . Dye intermediate.

**HOOKER  
CHEMICALS**

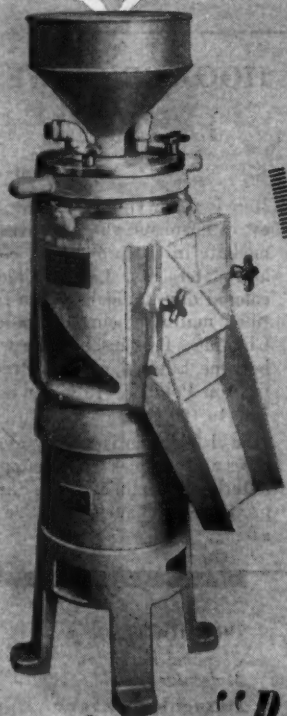
Caustic Soda  
Paradichlorobenzene

Muriatic Acid  
Chlorine

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8324

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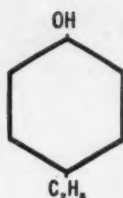
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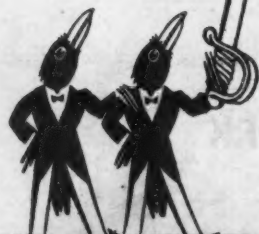
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# The Federated Research Bills

by ROBERT L. TAYLOR, editor

JOINT HEARINGS ON THREE SENATE BILLS to establish a national science program headed by a single Federal research agency are under way in Washington as readers receive this issue of *CHEMICAL INDUSTRIES*.

The three bills—S. 1297 (Kilgore-Johnson-Pepper), S. 1285 (Magnuson), and S. 1248 (Fulbright)—are almost identical in their stated objective "to promote," in the words of one of them, "the progress of science and the useful arts, to secure the national defense, and to advance the national health and welfare." In scope and in methods of administration, however, they contain marked differences which should be well understood so that members of chemical industry can pass accurate judgment on them.

**Probably the most important** difference is in the provisions for control of policy and administration. All three set up a new national administrative agency, to be known variously as the National Science Foundation (Kilgore), the National Research Foundation (Magnuson), and the Bureau of Scientific Research (Fulbright).

Kilgore places full power in the hands of a \$15,000 a year, presidentially-appointed director of this agency. He also provides for an advisory committee of eight public members appointed by the President, upon whom the director can call for advice but who have no authority. Fulbright likewise centers full power and direction in a single administrative head, but unlike the independent Kilgore agency, his administrative organization is a bureau within the Department of Commerce and is without any formal advisory group.

In contrast with these, the Magnuson bill vests all of its powers in a board of nine members who are appointed by the President, at no compensation, on a basis of "demonstrated interest in and capacity for" the job and not on an ex-officio basis. A \$15,000 administrative director is appointed by the board.

**The agency in all three cases** is to administer government funds for the carrying out of research on a national scale. Under the Kilgore and Magnuson charters, the research is to be undertaken in existing public and private research institutions. The agency is specifically denied the right to operate any research facilities of its own. Fulbright, on the other hand, pro-

vides for construction and operation, by the agency, of additional facilities if in the opinion of the administrator they are "necessary to carry out the provisions of the Act."

Nature of the research work to be undertaken under the Kilgore and Fulbright proposals is unrestricted as far as any distinction between basic and commercial research is concerned. Kilgore, in fact, states definitely that provisions of his act include "undertaking of economic and industrial studies, the experimental production and testing of models, and the building and operation of pilot plants." Moreover, his agency is instructed to "give particular attention to the development of methods and processes beneficial to small business enterprises, and to the adaptation to peacetime use of wartime research and facilities."

Along the same lines, Fulbright specifically instructs his agency to determine and develop, among other things, "such inventions, products, or processes as are found qualified for future commercial utilization" and to "offer to the public for nonexclusive private exploitation, such inventions as are determined fitted for private development."

**Magnuson; however,** while not emphasizing applied research, at the same time is so indefinite on what types of research his bill does cover that this important phase of the job is apparently left to the discretion of his nine-man board. The government grants could, if the board so directed, be limited to support of so-called basic or non-commercial research only; or they could be applied as widely as those in the Kilgore and Fulbright Bills. The Magnuson Bill's only statement on this point is that the agency "shall initiate and support basic scientific research and scientific development in the mathematical, physical and biological sciences."

As a final point of comparison, the Magnuson Bill empowers its agency "to negotiate such patent arrangements with research contractors as, particular situations may require in the public interest," while the other two provide for non-exclusive licensing of all discoveries and inventions resulting from government-financed research.

**Thus while the three bills** have the same highly desirable aim, they differ so widely in specific provisions, it seems to us, as to offer not only a choice between

success and failure in achieving that aim, but between possible acceleration and deceleration of our whole scientific and industrial progress. Government's entry into the industrial research field to the extent provided in the Kilgore-Johnson-Pepper Bill or the Fulbright Bill would certainly have a dampening effect on private research. To what degree is unpredictable, but the chances of complete nullification of any gains through the government research would seem to be good. Moreover, the concentration of power and authority in the hands of a single individual as provided in each of these bills exposes the whole program to political pressures and personal interests that could easily wreck it.

The Magnuson Bill avoids the major objections to the other two. However, in our opinion it is not a strong bill. It needs bolstering. It needs a clearer, more definite statement of intent than merely "to initiate and support basic scientific research and scientific development." If it is intended to provide action on Vannevar Bush's excellent recommendations in his "Science—The Endless Frontier," as it apparently is, it would do well to place greater emphasis on Dr. Bush's sound statement that "The simplest and most effective way in which the Government can strengthen industrial research is to support *basic* research and to develop scientific talent . . . Industry will fully rise to the challenge of applying new knowledge to new products."

It is to be hoped that this basic principle will be driven home by those members of chemical industry who are testifying on the national research bills in Washington this month.

## First Things First

FREE AND NON-MONOPOLISTIC licensing of patents is one of the chief aims of the Department of Justice and to that end numerous proposals have been made to foster patent utilization.

We are not concerned with specific proposals here, but we would call attention to a rubber-stamped statement on a returned order for patent copies: "Due to present conditions resulting from the war, reproductions of exhausted copies are several months in arrears."

On the other hand, this office received five copies of a booklet published by one of the government departments, each one accompanied by a long release announcing its availability.

It would seem that some of the government printing facilities might be diverted from superfluous handouts to some of the more important work, such as patent copies, now waiting on the shelf.

## What Can We Use in Place of War?

HARLOW SHAPLEY, Harvard astronomer and philosopher, describes in the August issue of *The Atlantic*

*Monthly* a great nation in a mess. A great many poor people were hungry, while other citizens destroyed their surpluses; more than ten million were unemployed; the desires of the laborers for greater pay and prestige were doing badly; the young men and women received little systematic training in health or patriotism. In this economically and spiritually confused country, diseases like measles, pneumonia, and syphilis were badly controlled; mosquitoes and flies were destined to be eternal pests and carriers of disease.

All of a sudden these ills exist no more. The people as a whole eat well. There is practically no unemployment. The nation is healthier. Sensational advancements in the treatment of certain diseases, new knowledge of food, new and widespread instruction in applied science, geography—even reading and writing—have come about. The political and social prestige of labor has increased remarkably, and millions of citizens have billions in savings. Even in our own chemical industry payrolls have tripled since 1939.

We wish we could report that all these benefits were the result of some great awakening—a kinetic transformation of mankind's potential energy for good. But alas no, these advantages accrued from, and were offset by, the bloodiest war in history.

Are we to conclude, then, that we must have war and all its suffering and destruction in order to improve our lot? Or is there a substitute enemy against whom we can rally our economy, our knowledge, our unity, our determination and sacrifice?

Ignorance, illiteracy, and disease are worthy foes, and "we may discover that an enthusiastic warfare against such opponents, even if only partially successful, is a fair substitute for warfare against fellow men. At least it would emphasize the absurdity of world wars or national wars where life and property are wildly squandered, while those greater enemies—the enemies of the soul, mind, sometimes body—are almost completely ignored."

Competition is a kind of warfare, and its healthy effect is to stimulate increased buying and thereby raise the standard of living. From that point of view, even though competitors are fighting among themselves for markets, they are united in the struggle against inertia and complacency.

Perhaps—though we doubt it—these latter enemies are enough to absorb our energies and keep our economy at a close-to-wartime level. If not, it behooves us to consider Dr. Shapley's suggestions: to tackle larger opponents worthy of our mettle; to convince ourselves and our fellow citizens of the necessity for vigorous and expensive warfare against ignorance and disease; to prosecute with zeal the search for new knowledge and its application for the common good; to develop the resources, both material and spiritual, of our own communities; to unite, as determinedly as against our mortal foes, against those enemies that obstruct or challenge the social and intellectual growth of men and of human society.

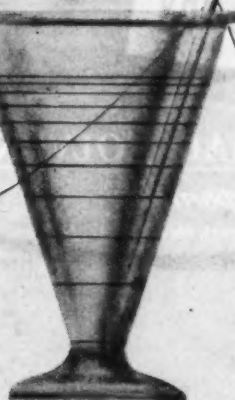


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# NICKEL from CUBA

## Nicaró Produces Nickel Oxide by Leaching with Ammonia

by MAURICE F. DUFOUR\* and ROBERT C. HILLS\*\*

Nicaró Nickel Co., Nicaró, Oriente Province, Cuba



THE DEVELOPMENT and installation of the process of leaching with ammonia for the recovery of nickel oxide from the lateritic iron ores occurring in Oriente Province on the north coast of Cuba provides a fascinating story. In three years the process was developed from a pilot

plant processing one ton of ore per day to a commercial installation capable of handling 3600 tons of ore per day.

IN FEBRUARY 1940, Pardners Mines Corporation approached the Freeport Sulphur Company with a project for the recovery of nickel from the lateritic ores occurring on the north coast of Cuba. Pardners Mines had been actively interested in the possible commercial development of these ores since 1937. During the course of their investigations, it was found that certain areas contained sufficient nickel to be classified as commercial ore, and attention was then directed to the development of an economic method of extraction.

Ore reserves had been satisfactorily established by the time the project was brought to Freeport's attention. Preliminary development work on a small scale had begun, but the results obtained had shown unexplainable inconsistencies. However, the basic chemistry was apparently sound and it was felt that additional

testing would eventually produce a successful process. An agreement was reached with Pardners Mines by which Freeport assumed control of the project and the Nicaró Nickel Company, a wholly owned Freeport subsidiary, was formed to continue exploration and development work.

Investigations on the original process were conducted in the laboratory and in a small pilot mill treating 600 pounds of ore daily until February 1941, when further work was abandoned. Although some satisfactory results were obtained, the results were highly erratic and it was concluded that the problems of process control involved were beyond practical solution. During the course of this work, literature surveys had directed attention to the possibility of extracting nickel from the lateritic ores by a process involving ammonia-leaching. Since the preliminary stages of both processes in question were the same, some laboratory

experiments on ammonia-leaching were begun in November 1940. The results obtained here played a part in the decision to abandon the earlier project.

The ammonia-leaching process was ready for pilot plant testing in early 1941, but in view of the size of the proposed project and existing war conditions, it was considered advisable to approach the Reconstruction Finance Corporation to ascertain the Government's interest in another source of nickel for the war emergency. A committee of metallurgists was appointed by Reconstruction Finance Corporation to review the process which, in July 1941, reported favorably and recommended the project, subject to the successful operation of the partially designed one-ton per day pilot plant. Design and construction on this plant was rushed to completion and operations were commenced in August 1941 at the Hoskins Mound, Texas plant of Freeport.

Initial operations of the pilot plant met with the usual mechanical and process difficulties, but by the end of November 1941, the investigating committee was advised that operations were proceeding satisfactorily. Arrangements were made for a complete investigation of results during the month of December, and in January 1942, the project was finally recommended to Reconstruction Finance Corporation. Construction of a plant to treat 3,600 dry tons of ore daily was approved in Feb-

\* Assistant General Manager.  
\*\* Metallurgical Manager.

ruary 1942 with funds to be provided by Defense Plant Corporation along with a contract for the operation of the plant for the account of Metals Reserve Company.

Then began the hectic period of design. During the pilot plant operation it was well recognized that if the project were approved, the war emergency would not allow construction and operation of a semi-works unit with a capacity of 100 tons per day, which would normally furnish the information required for efficient design. Efforts had been concentrated, therefore, on the firm establishment of the basic factors affecting the efficiency of the process and on an attempt to work out a flow-sheet which would embody as many standard and proven operations as possible. It was with these basic technical data and preliminary flow-sheet, developed during six months of operation of a one-ton per day plant, that a 3,600-ton per day plant was designed.

#### CHEMISTRY OF THE PROCESS

The ammonia-leaching process for the recovery of nickel is based upon the fact that ammonia and ammonium salts react energetically with active metallic nickel in the presence of oxygen to form soluble ammonia complexes. Since the nickel values in the ore do not exist in the metallic state, a preliminary reduction is necessary before the ammonium salts will exert any solvent action. After leaching the reduced ore, the pregnant nickel-bearing solution, when stripped of ammonia, precipitates basic nickel carbonate, which is then calcined to nickel oxide.

The formation of soluble ammonia complexes from metallic nickel or its salts has been the subject of many investigations on the chemistry of coordination

compounds. Although practically all of the common ammonium compounds exert a solvent action on metallic nickel, laboratory experience showed that the basic ammonium compounds offered the most promise for commercial application. A mixture of ammonium hydroxide and ammonium carbonate was finally adopted in the Nicaro process, particularly since the volatility of the constituents facilitated solvent recovery operations.

The nickel content of the Cuban ore occurs in two forms. In one form, nickel replaces some iron in the space lattice of ferric oxide and in the other, it apparently replaces some magnesium in the space lattice of serpentine. The ferric oxide occurring as limonite, is the end product of the alteration of the original peridotite, the serpentine representing an intermediate stage. In reducing the ore prior to leaching, conditions must be controlled to prevent solution of both iron and magnesium by ammonia. Reduced iron dissolves as ferrous ammonium carbonate but, in the presence of oxygen, this compound oxidizes and hydrolyzes with precipitation of ferric hydroxide. Although precipitation of iron produces no contamination of the final product, it consumes oxygen necessary for the solution of the nickel. The slight solubility of the magnesia present in the reduced ore causes no serious contamination of the final product. Its deposition from solutions on slight cooling, however, gives rise to problems of scaling of equipment.

Preliminary laboratory work was devoted to verifying some of the basic facts contained in articles by Caron (1) and Tatebe (2) on the extraction of nickel from its ores with ammoniacal solutions, as applied to Cuban ores. Optimum operating conditions were determined in about

six months operation of the one ton per day plant.

#### PILOT PLANT DESIGN AND OPERATION

By the time the pilot plant was ready to be designed, the process had been divided into its main operating divisions, as follows:

1. Wet ore storage and handling
2. Drying
3. Grinding
4. Reduction
5. Leaching and Washing
6. Product Precipitation and Ammonia Recovery

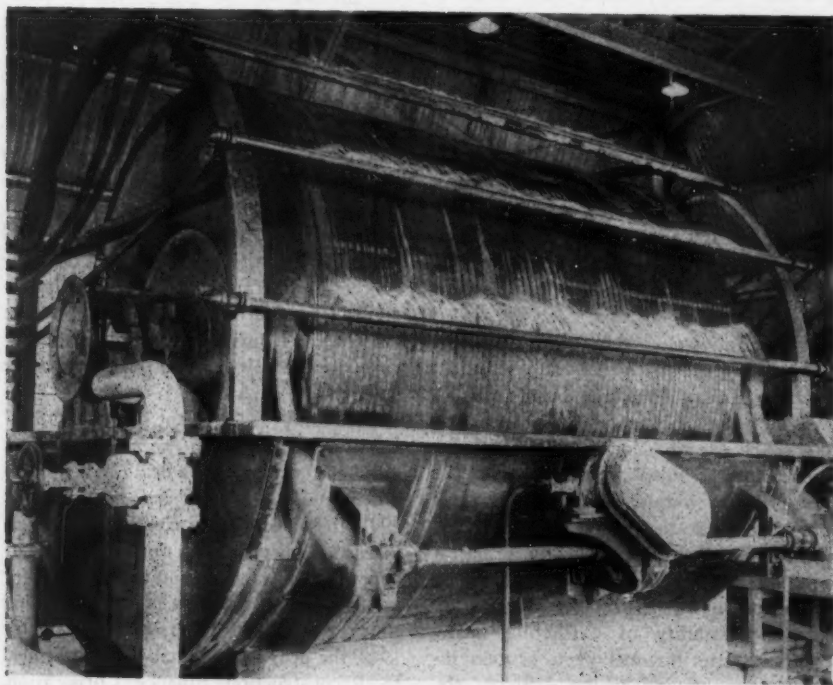
The first three process steps represent purely physical and mechanical operations and pilot plant work was not considered necessary. Data on the physical properties of the ore were available from the history of the operations of the Bethlehem Steel Company at Felton. The ore was reported to be very difficult to handle, particularly during rainy seasons, as its tendency to stick to metal surfaces and to agglomerate in large balls made it difficult to empty railroad cars and handle buckets. The solution of material handling problems, however, rested in the proper selection of equipment for any contemplated commercial unit and was not a problem for pilot plant investigation.

The ore in its native state is in a finely divided condition because of its mode of formation by long-time decomposition and weathering of rock, consequently, the grinding problem was more one of disintegration rather than grinding. Some preliminary tests in a hammer mill indicated that the major part of the grinding operation could be carried out in this type of equipment, using ball mills in a secondary circuit. For this reason no pilot work on a small scale was planned. The ore was shipped in bags from Cuba and was custom-dried and ground in the States and then re-bagged and shipped to the pilot plant. Laboratory experience had shown that minus 80 mesh material (actually over 90% of the material is minus 325 mesh) gave optimum extraction.

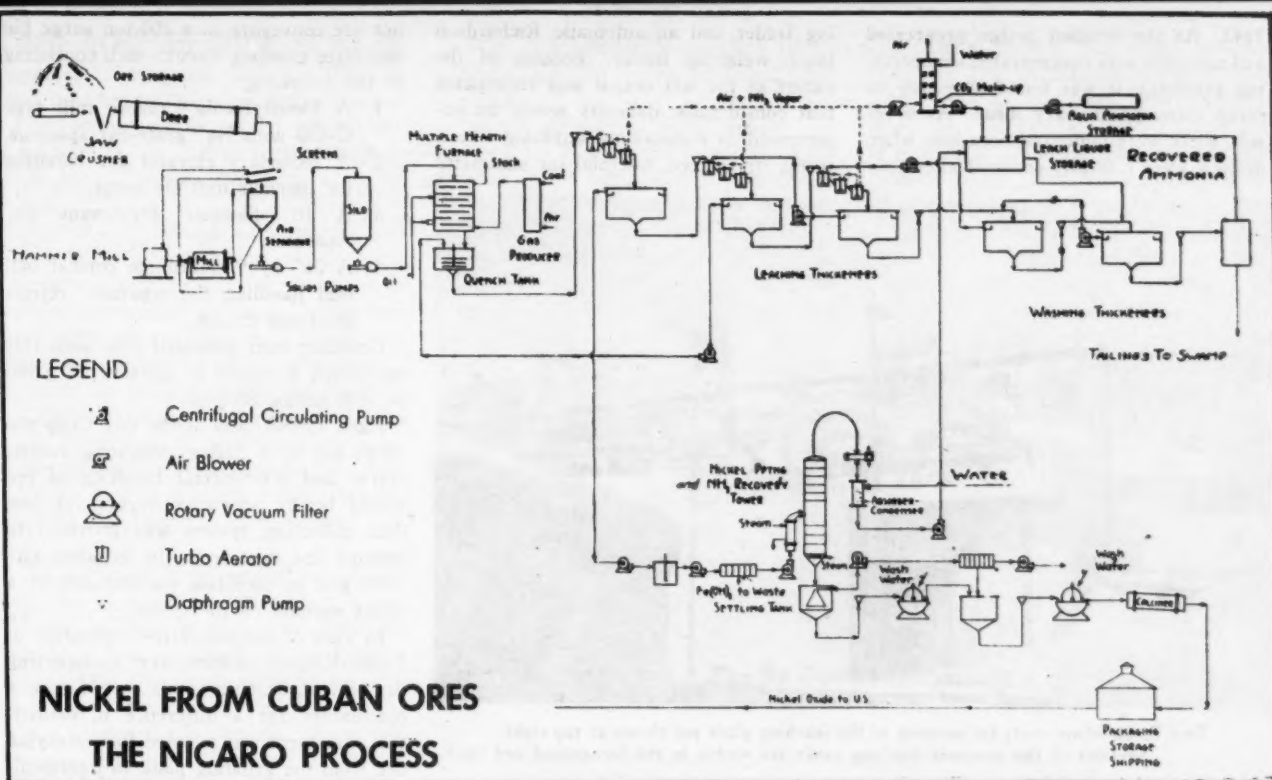
The ore is then reduced and subsequently leached. These two steps embodied the major portion of the technical problems, directing primary attention in the pilot plant to these processing steps. The multiple hearth furnace was chosen as the reduction unit partly because it seemed to offer some processing advantages but more particularly because the prediction of results on a large scale based upon relatively small scale operations was considered more reliable than for other types of furnaces.

The pilot plant furnace was a 36" diameter 10-hearth Nichols-Herreshoff unit. Each hearth was equipped with four arms rather than the conventional two to improve rabbling.

A small Wellman-Galusha gas generator was installed to furnish producer gas. The large scale production of producer



Oliver rotary filter, 8' x 8', for separation of the precipitated basic nickel carbonate before its calcination to nickel oxide.



gas was to be a standard operation involving the use of No. 1 or No. 2 Buckwheat anthracite and no technical problems were involved in this operation.

For the leaching operation, Turbo-mixers were chosen for the pilot plant because of the requirements of efficient air distribution and violent agitation. Two laboratory-size units in series were employed in each of three leaching stages. The necessity of multiple leaching stages had been demonstrated in laboratory tests. This method of operation provided a means for building up a nickel concentration in the final pregnant liquor without adverse effect on nickel recoveries.

The continuous thickeners for the pilot plant were designed and built in the Freeport shops since small scale equipment of the required size was not available on the market. The thickeners were 3.5' in diameter with conical bottoms. The drive mechanisms were fabricated from miscellaneous materials available including rear-end gear assemblies off of old Ford trucks. The underflow from the thickeners was regulated by adjustment of solenoid time valves.

In addition to the three stage leaching system, a single washing stage was provided, primarily to reduce the soluble nickel loss from the last thickener. The actual development work and process testing for the washing system was done on a laboratory scale, as was all work for the determination of settling areas required for the commercial plant.

In the product precipitation and ammonia recovery section of the flow-sheet the pilot plant was equipped with a 12" diameter distillation column and a laboratory-size Oliver continuous filter for separation of the basic nickel carbon-

ate. No attempt was made to install ammonia recovery equipment. The background of experience in ammonia recovery in the soda ash industry and the successful history of the Calumet and Hecla Copper Company operations with an ammonia-leaching process on copper made it unnecessary to undertake any pilot plant development on this step. Attention was devoted primarily to a study of the distillation characteristics of the pregnant liquor and to the variations in physical properties of the basic nickel carbonate precipitate under varying operating conditions.

Calcination of the carbonate to nickel oxide was done on a small scale in a laboratory furnace. Investigations were made to determine optimum calcining conditions and the effect of variations on the composition and physical properties of the oxide.

On the whole, operation of the pilot plant was smooth and the results consistently good. At the outset, some difficulty was experienced with the ore in the furnace because of its tendency to become "sticky" at temperatures around 1200° F. The rabble teeth on the small furnace were originally spaced with a clearance between faces of only 1.5". This presented quite a resistance to the movement of the arms through the bed, greatly accentuating the tendency of the ore to roll up like snow in front of the arms. Increasing the spacing between teeth helped the condition materially but periodic poking of some hearths was necessary. It was felt that the problem would be eliminated in large equipment where the tooth spacing would be sufficient to allow the ore to pass through the teeth in spite of some cohesive tendency. This proved to be the case.

Control of furnace conditions presented some problems because of excessive radiation losses from the small equipment. Recycling a sufficient quantity of gases through the combustion chamber finally made it possible to hold reducing conditions within the desired ranges.

The pilot leaching system presented more mechanical than technical problems, because of its size. Operation of the small system as a continuous counter-current process necessitated close control of small volumes but by re-cycling additional quantities and by the liberal use of solenoid time valves, the problem of control was solved. The relatively slow flow in lines and the abnormal temperature drops focussed attention on the operating problems arising from the precipitation of magnesium from liquors and pulps. To counter this problem sufficient duplicate lines were provided to facilitate cleaning.

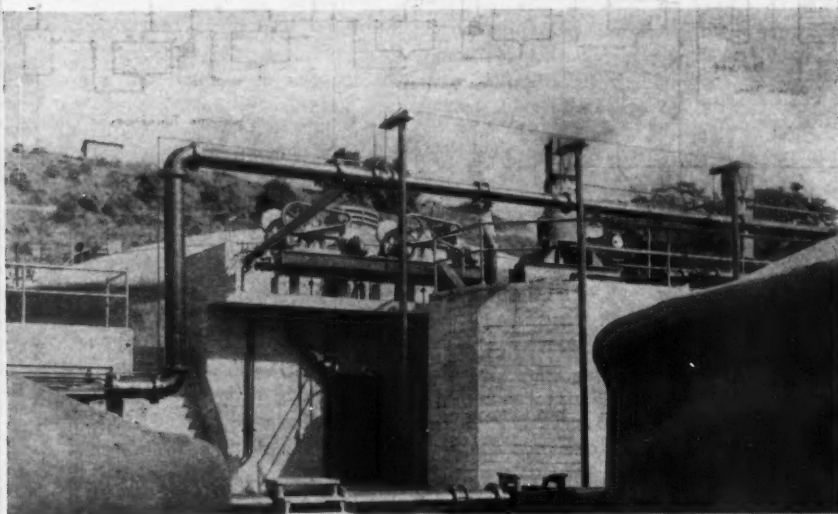
Operation of the small distillation column for precipitation of basic nickel carbonate from pregnant liquor revealed that scaling problems would necessitate periodic cleaning of columns. In the distillation of copper-containing liquors at Calumet and Hecla this same problem was known to exist, and the character of the copper oxide precipitate is such as to require air-chisels for cleaning. Basic nickel carbonate allows a longer operating cycle because of its lower density and lesser tendency to settle out and compact on trays.

#### DESIGN OF COMMERCIAL PLANT

During the operation of the pilot plant a considerable amount of work was done on chemical engineering calculations for all plant sections, laying groundwork for the detailed plant design begun in March

1942. As the detailed design progressed and attention was concentrated on operating problems, it was found necessary to scrap many preliminary ideas. As a result, there were numerous occasions when designs were radically changed after they

ing feeder and an automatic Richardson batch weighing feeder. Because of the nature of the wet ore, it was anticipated that considerable difficulty would be experienced in maintaining anything like a steady dryer feed, essential for successful



Two Turbo-Mixer units for aeration in the leaching plant are shown at top right. Sections of the concrete leaching tanks are visible in the foreground and back.

had progressed well along toward completion. In some cases, the changes were not necessitated by process considerations, but by the unavailability of materials and equipment in time to fit with proposed construction schedules. It is not within the scope of this article to discuss the details of such problems and, consequently, only the major design considerations will be treated. Changes made from the original design and construction as a result of preliminary operating experience will be discussed in a subsequent section.

To have sufficient ore storage capacity at the plant, and to facilitate ore blending, a working storage area with a capacity of about 60,000 tons serviced by two Gantry cranes was provided. The cranes were to handle the ore from the railroad dumping track at one side to the pile and to load the ore into two Stephens-Adamson traveling feeders which feed a 36-inch belt conveyor.

It was known that the ore from the mine would contain large boulders from the serpentine section of the deposit which would interfere with dryer feeding and operation. As a primary crusher unit, therefore, a Jeffrey double roll crusher was provided to reduce rock to a maximum size of 4". In the original design, the crusher discharged on an inclined belt to the dryer building where the ore was fed to another belt equipped with scrapers for feeding individual dryers.

An inside storage of about 5000 tons of wet ore was also provided for rainy weather and emergency operations. This area was to be serviced by a P&H traveling crane capable of feeding each dryer unit directly.

The feeding equipment for each dryer consisted of a Stephens-Adamson travel-

operation of the concurrent dryers utilized here. For this reason that an elaborate dryer feeding system was provided.

The choice of concurrent dryers was based on the successful use of this type of equipment in drying materials like raw phosphate rock, the physical properties of which closely resembled those of our raw ore. Rapid preliminary drying in a high temperature zone was considered essential to prevent balling of the ore. For this service, four Allis-Chalmers rotary dryers 135' long were provided. The driers have an enlarged feed end section 14' in diameter and the main body of the units has a diameter of 11.5'. The enlarged feed end section was provided to reduce gas velocity from the combustion chamber into the kiln and to allow placing the ore feed spout in an off-center position out of the path of the combustion gases. The heat load on each individual unit is high, particularly when the moisture content of the ore goes above 30% during the rainy seasons. To obtain efficient utilization of the large combustion chamber space required, the chambers were designed for tangential firing.

The discharge end of each dryer was equipped with a Hardinge rotary table feeder to get a satisfactory positive ore seal. Cyclone dust collectors were also included for removing dust from the dryer exhaust gases. Duplicate conveyors were provided for transporting the ore from the drying plant to the grinding plant and weightometers were included at this point to record the ore feed through the plant.

The grinding plant was designed on the basis of small scale grinding tests on various samples of different types of ore. The design included two primary elevators for lifting the discharge from the

hot ore conveyors to a 200-ton surge bin and three grinding circuits each consisting of the following:

1. A Pennsylvania hammer mill type C-430 with  $\frac{3}{16}$ " grate-bar spacings.
2. A secondary elevator for handling the hammer mill discharge.
3. A 16' diameter Sturtevant air-separator.
4. A 36" by 9' Hardinge conical ball mill handling the separator rejects in closed circuit.

Grinding tests indicated that with this equipment it would be possible to grind to 95% minus 80-mesh.

Each circuit was to be fed from the surge bin by a Jeffrey vibrating feeder. Intra- and inter-circuit handling of ore would be by screw conveyors. A bag dust collecting system was provided to remove fine dust from the grinding circuits and to facilitate maintenance of a slight vacuum on the system.

In view of the successful application of Fuller-Kinyon systems for transporting dry cement, which is similar to the ground ore except for a difference in density, this equipment was adopted for conveying ore from the grinding plant to intermediate storage silos and to the furnace plant.

Eight concrete silos with a capacity of 10,000 dry tons were provided as an emergency storage and as a final means of blending ore and maintaining uniform plant feed.

Up to this point the operation follows established plant practices and, as noted, standard methods were adopted to the fullest extent possible.

The design of the furnace plant represented the real departure from established practices. The detailed engineering work on this section of the plant was done by Nichols Engineering and Research Corporation, who supplied the multiple hearth furnaces. The largest furnace manufactured is 22.5' in diameter and, up to the building of this project, the biggest furnace built had 14 hearths. The maximum number of hearths that could safely be built because of drive and structural limitations was 16 and the Nicaro furnaces were designed to this limit. Information on retention time developed in the pilot plant was translated to the large furnace and its capacity estimated at about 15 tons per hour. In order to provide some safety factor at this critical stage and to allow for furnace down-time, a total of twelve furnaces were included in the design for a daily average capacity of 3600 tons.

Since the furnaces are operated under pressure, all-welded construction was used and special inspection and access doors provided. Four rabble arms were used in all hearths to give additional rabbling, as in the small furnace. Because of the deleterious effect of oxygen on the furnace operations, the center shaft cooling system was designed to operate with steam instead of air, which is normally used. Steam at about 220° F. enters the

bottom of the shaft and leaves the top superheated to about 500° F. There it is desuperheated by water sprays and the excess steam used to preheat power plant feed water. The balance of the steam is recirculated through the center shaft by a fan.

Special ore heating requirements and the inability to use excess air in firing the furnaces called for the design of a special combustion system. Hauck proportioning oil burners were chosen for the close combustion control required.

Based on the use of 12 furnaces, each at 300 tons per day average capacity, the ratio of expansion over the pilot plant size at the critical process point was actually 300 to 1 in a single furnace instead of 3600 to 1 indicated by the overall figure.

Later, when construction was under way and all equipment purchased, it was felt that sufficient stand-by capacity might not have been provided in the furnace plant. This was emphasized by the fact that two furnaces were tied together as a unit beyond the furnace discharges and, consequently, there were a number of potential trouble spots which could take one-sixth of the plant out of production. It was also believed that refractory troubles in the combustion system might be greater than at first anticipated, resulting in additional furnace down-time. It was not possible to fit in the design, purchase and delivery of additional multiple-hearth furnace capacity with existing construction schedules. Attention was, therefore, given to the possibility of purchasing a second-hand rotary kiln of suitable design for adaptation to our conditions. A satisfactory unit was found

and approval obtained to include a rotary kiln as a stand-by unit for additional plant capacity.

Jacoby conveyors were chosen for handling the hot ore discharged from the furnaces, these being standard equipment for handling hot calcines from roasting furnaces. Special gas seals were developed along with engineers of the Hardinge Company, this being the only deviation from standard design. Two furnaces discharge into a common conveyor which, in turn, discharges to a Hardinge horizontal rotary cooler, 9' by 60', partially immersed in a water tank and revolving at 6 R.P.M. After cooling, the ore is conveyed by inclined screws to tanks where it is mixed with liquor from the leaching plant, from which it is pumped to the leaching plant.

For the aeration units in the leaching plant, Turbo-mixers were chosen because of their successful use in the pilot plant. Tank sizes for proper retention and air requirements for leaching were extrapolated from pilot plant results. The leaching plant was designed as three parallel lines, each with three stages. The Turbo-mixers for each individual stage are built in blocks of three to minimize short-circuiting and limit the size of each unit. Air for aeration in the original design was furnished by Sutorbilt cycloidal blowers but this was subsequently amplified with Nash Rotary Compressors. A suitable scrubbing system was provided to recover ammonia from the air used in the process.

The thickeners in the leaching plant are 75' diameter Dorr torque type "S" units. Similar units are used in the washing plant but this section was designed in

two parallel lines of four stages and the units are 110' in diameter. These sizes were based on unit area determinations made on a laboratory scale. The lay-out of equipment in the leaching and washing sections of the plant was carried out by the Dorr Company.

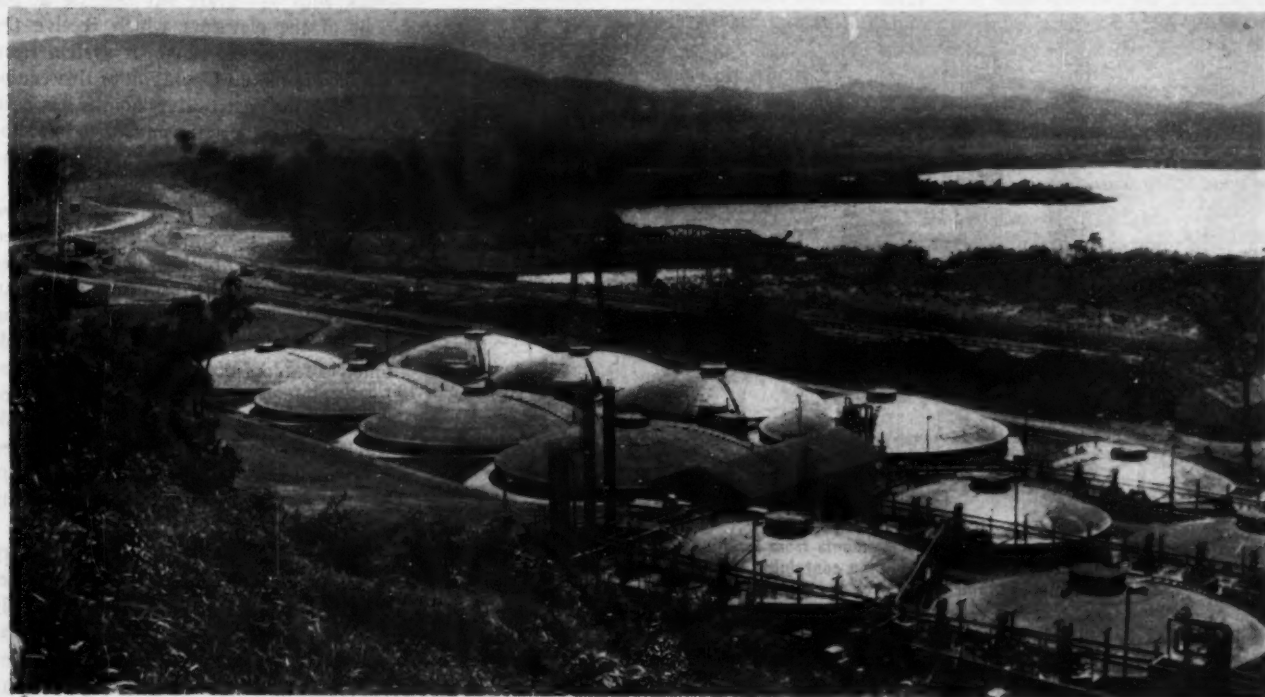
Tanks in the leaching and washing plant were designed and built by National Guniting Contracting Company. The tanks are of pre-stressed concrete construction with dome-shaped roofs to prevent atmospheric ammonia losses. The shortage of steel during the emergency period made it impossible to obtain the plate required in the quantity necessary to build all tanks.

In the product precipitation and ammonia recovery section of the plant, the experience of Semet-Solvay Engineering Corporation was utilized in the design. In addition to Semet's general broad experience in this line, their specific experience in the design of the Calumet and Hecla distillation and ammonia recovery equipment was invaluable. Stills similar to the Calumet and Hecla units were adopted with standard condensing, absorbing and cooling equipment.

Filtration of the basic nickel carbonate by 8' x 8' Oliver vacuum filters followed pilot plant experience and data. An intermediate thickener step ahead of filtration was added to lighten the load on the filters.

An F. L. Smith "Unax" kiln was chosen for the calcination of the wet nickel carbonate to the oxide. The unit is 10' x 132' and is brick-lined for 80'.

A dry cyclone dust collector was provided to remove the major portion of the oxide from the kiln gases and recycle it



The large mushroom-like tanks on the right are for the leaching of the nickel content from the ore while the two lines of four on the left are for washing the treated ore before its final discharge. The tanks are of concrete construction, the Dorr thickeners in the leaching tanks being 75' in diameter while those in the washing tanks are 110'.

to the kiln feed. A wet collector is used to remove all final traces of oxide, its discharge going to the thickener handling the slurry from the product distillation columns.

Cooled oxide from the kiln is transported by screw conveyor and Bulk-Flo elevator to the nickel oxide warehouse where it is bagged for shipment.

#### PROBLEMS IN INITIAL OPERATIONS

Construction in Cuba was proceeding simultaneously with design in New York, but in spite of many design changes, there were no cases of any consequence where such changes affected the program of construction. Work on railroad, housing and temporary facilities was commenced in Cuba in April 1942, actual construction of the metallurgical plant beginning in September 1942. The work was pushed with all possible speed and by October 1943, initial operating tests on sections of the drying and grinding plants were initiated. As expected, the rainfall in October lived up to all advance notices, furnishing an interesting but not entirely welcome opportunity to study ore handling problems at their worst. Other plant sections were partially completed and tested during November and December so that the first shipment of oxide from Nicaro was made by plane on December 31, 1942—sixteen months after breaking ground for the plant itself.

Unusual problems involving the handling of both wet and dry ore were encountered at the outset of plant operations. During the wet season the ore is often extremely sticky and means had to be devised to keep the wet ore from adhering to every surface with which it came in contact. The addition of spray washing

the wet ore to the four rotary dryers had to be abandoned. As previously noted, this equipment consisted of a flat belt with adjustable scrapers to distribute the ore to the heavy duty traveling feeders ahead of the dryers. The ore built up rapidly on the scraper blades making it impossible to proportion the feed properly. A number of alterations were made to the scraping devices but the improvisations were not successful and after about a month's operation, the scrapers were removed and the belt shortened to deliver the ore at a central point in the covered storage area of the Wet Ore Building. Since that time, the dryers have been fed by means of two overhead cranes equipped with heavy duty clamshell buckets. One crane was originally installed as a standby for the scraper belt system, the second being installed some time later. Experience has shown that one crane with a properly designed bucket can easily handle the equivalent of 4,000 dry tons per day.

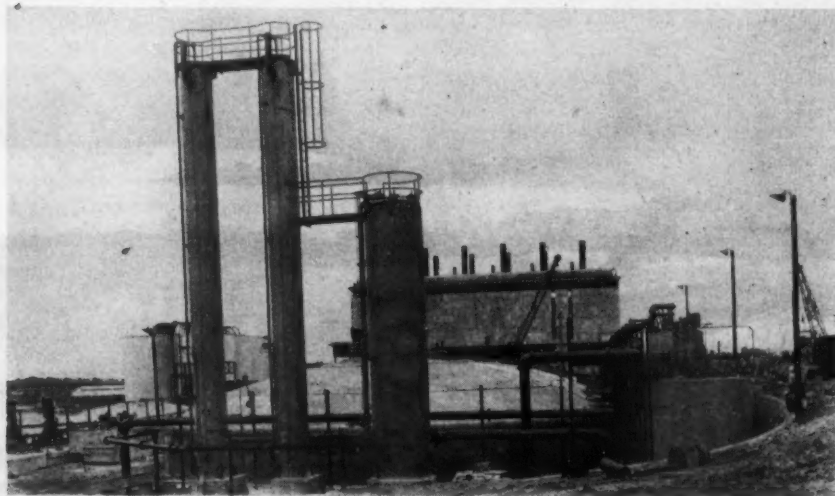
The original design of the dryer feed system contemplated use of an automatic conveyor-scale of the intermittent type interlocked with a heavy duty pan feeder. The pan feeder received ore either from the scraper belt system or from the overhead crane and delivered it to the belt of the scale mechanism by a predetermined time cycle. After operating the scales for a short time, it became apparent that they would not stand the heavy service. Modifications to scales and supports proved to be ineffective and finally the control mechanisms were removed and the scale converted to a simple belt conveyor. After use of the scale was discontinued, an arrangement of heavy ham-shaped weights was developed to adjust the depth of the

pronounced flooding tendencies, making it extremely difficult to discharge the dryers without losing the seal necessary to maintain draft control. The rotary table feeders originally installed to discharge the dryers would not control flooding of the hot, pulverulent ore and, although many modifications were tried, they were soon discarded. The rotary tables were replaced by simple chutes and weight loaded gates, the counterweight on the gates being adjusted so that a very small head of ore is required to open the gates. This device has operated very satisfactorily, and requires little or no attention on the part of the operators.

The flooding characteristics of the ore offered more serious problems in the grinding plant, especially in regulating the feed to the three grinding circuits from the 200-ton steel surge bin. The vibrating feeders originally installed for discharging the bin were abandoned after several unhappy experiences in which a hundred or more tons of ore uncontrollably flooded out of the bin onto the mill floor. Several types of screw conveyors, including inclined and variable pitch types were tried next, but without success. The behavior of the hot, dried ore resembled that of water and it was recognized that only a positive volumetric feeder could control the flow of the material. With this idea in mind, large star feeders of heavy steel construction and equipped with variable speed drives were designed and constructed locally. The new feeders did not operate as satisfactorily as hoped because of the large lumps of hard serpentine in the dried ore, which often jammed the feeders and sheared the safety pins. This condition was permanently corrected by installing hammer mills with  $\frac{3}{4}$ " grate bar spacing at the boot of the elevators which receive the ore from the belt conveyor system from the drying plant. Operation of this equipment for the past twelve months has been most satisfactory and contrary to expectation, the maintenance on the feeders has been negligible.

Variable pitch, variable speed screw conveyors were originally installed to feed fine ore to the multiple hearth furnaces from overhead bins. The ore at this point, however, displayed the same flooding characteristics previously described. Volumetric feeders of the same type successfully employed in the grinding plant provided a suitable stopgap until suitable roll-pocket feeders could be delivered from the States. The pocket type feeders have now been operating satisfactorily for about a year.

The initial performance of the rotary ore coolers was very poor for the design discharge temperature could only be attained at about 50% of rated capacity. It was found that the poor performance of the coolers was due to an inherent property of the reduced ore which made it stick tenaciously to the relatively cold surfaces of the shell and form an



Equipment for the recovery of ammonia from leaching tank aeration air in the foreground, the furnace building containing the Nichols-Herreshoff reduction equipment, and one line of the leaching tanks in the background.

systems on the belts handling the wet ore and self-cleaning scraping devices on the crane buckets alleviated the wet ore problems to a large extent.

Because of the adhesive nature of the ore, the original scheme for distributing

ore bed in the feeder. This volumetric method of controlling the feed to dryers has been successful.

The ore discharged by the dryers varies in size from 4" lumps to minus 325 mesh material. It aerates easily and exhibits

insulating layer. Although many schemes have been tried, no means have been discovered for overcoming this difficulty. The only satisfactory solution to the cooler problem has been to strip the outer shell of flighting, install dam rings and heavy scraper bars to remove the ore film from the surface of the shell mechanically. At the present time the ore coolers are operating at discharge temperatures somewhat above that originally anticipated and for unknown reasons the coolers are extremely sensitive to changes in load.

Unforeseen difficulties arose soon after the plant was put into operation from the accumulation of "oversize" material in parts of the leaching circuit. This trouble was aggravated in the early stages of operation by the extremely dense nodular hematite present in the upper portions of the ore body. Increasing the fineness of the grind in the dry grinding section from 95% minus 80 mesh to 90% minus 100 mesh, and redesign of the air distribution system in the aerators eliminated this source of trouble. The installation of the primary hammer mills ahead of the ore surge bin has made it possible to maintain rated throughput in the grinding plant despite the increased fineness of the grind.

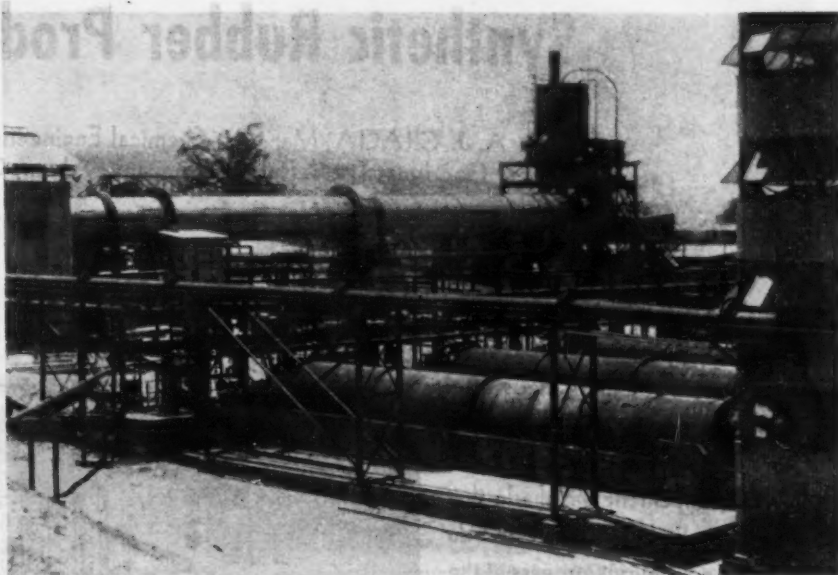
To insure continuity of operations at full capacity in case of equipment failures in the dry grinding section, an installation has been provided for hydraulic classification of the ore pulp before leaching, with provisions for wet regrinding of oversize. As yet, it has not been necessary to operate this equipment.

The initial performance of the aerators was not satisfactory and nickel recoveries were not up to expectations. After experimentation, it was found that additional impellers, revisions in the air distribution system, and an increased air supply would greatly improve the efficiency of these units.

It had been anticipated that artificial cooling of the leach liquor might be required, but it was impossible to obtain sufficient data from the pilot plant operations to make an accurate heat balance in advance of actual operations. After one leaching unit had been put into operation, it was determined that thermal equilibrium could not be maintained beyond about 65% of rated plant capacity without cooling of the leach liquor. The design of a cooling system was complicated by rapid deposition of magnesium ammonium carbonate scale from the leach liquor on heat transfer surfaces. However, the scale is very soluble in dilute, inhibited sulphuric acid and this method of cleaning the heat transfer surface was incorporated in the design of the cooling system. The liquor coolers finally installed consist of five banks of seven shell and tube heat exchangers of the conventional floating head design. The cooling system has now been installed for about a year and on the whole it has given ex-

cellent service. In recent months, some corrosion has been experienced on the water side of the tubes due to bio-fouling, but it is believed that chlorination of the cooling water will correct this condition. Deposition of magnesium-ammonium

The corrosion of the tubes in the heat exchanger equipment handling strong ammonia solutions has been the most serious corrosion problem encountered thus far. Welded steel tubes are entirely unsatisfactory for this service, as experience has



The rotary hot ore coolers in the foreground turn at about 6 R.P.M. and are partially immersed in water. The rotary kiln in the background is a standby unit to provide ore reduction capacity in addition to that obtainable from the Nichols-Herreshoff units.

carbonate scale in lines handling leach solutions and ore slurries has been noted. The difficulty arises from the fact that the soluble magnesium content of the ore saturates the liquor under most operating conditions. Regulation of temperatures and ammonia concentrations have helped to control the deposition of scale in the washing system and certain parts of the leaching system, but in many places the only solution has been to install duplicate lines and clean at regular intervals to insure continuity of operations.

Serious corrosion trouble has been experienced only in certain pieces of equipment handling the strong liquor recovered from the ammonia distillation operations. All-iron pumps, ordinarily satisfactory for handling strong ammonia solutions, failed after a few weeks' service. Cast iron pumps fitted with stainless steel shafts, gland rings and the like gave better service, but the life of the units was still not satisfactory. The pump problem has now been completely corrected by replacing the cast iron pumps with units constructed of a 24-20 nickel-chrome alloy. After more than a year's service, the water parts of the alloy pumps do not show any signs of corrosion.

Localized failures of pipe lines and valves in the strong liquor service as the result of cavitation and corrosion at points of high liquor velocity were frequent in the early operations. Reduction of velocities wherever practical and the use of resistant alloys or rubber covering where high velocities are inevitable, have reduced failures of this type to a point where they are no longer a problem.

shown that they rapidly fail along the welds. Seamless steel tubing has given somewhat better service, but even its life is not more than a few months. Stainless steel tubes of the 304 type showed up well in corrosion tests, but proved disappointing in practice, proving to be little, if any, better than the seamless steel tubes. Fortunately, the use of aluminum tube bundles provided a satisfactory answer. After a service test of four months, an aluminum tube bundle showed absolutely no corrosion on either the liquor or the water side.

As a matter of record, relatively few purely mechanical difficulties have developed, although certain pumping units suffered from bearing trouble which required considerable modification to correct. It is worthy to note that such alterations and additions as were found necessary have been confined to accessory equipment and have not resulted in any fundamental changes in the flow-sheet of the basic processing units. The revisions required were troublesome because of the delays which they entailed rather than their inherent importance. Notwithstanding the foregoing and other minor tribulations which always accompany starting up operations of a plant this size, all of the operating units were in service by the middle of 1944, and since that time, there has been a progressive increase in output and efficiency as the operations have smoothed out.

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# Continuous Polymerization Achieved In Synthetic Rubber Production

by A. J. GRACIA, Manager, Chemical Engineering Division  
Goodyear Tire & Rubber Company, Akron, Ohio

THE WARTIME SYNTHETIC Rubber Plants were designed for continuous operation through all steps after the initial one of polymerization, which was batchwise. Several months ago the announcement was made that this initial step had finally been made a part of the continuous process at the Houston, Texas, copolymer plant, with obvious economies and other advantages. Here is a description of how it was done and the results achieved.

UNDER pressure of the emergency of 1941-42, chemists and chemical engineers evolved a process for the manufacture of butadiene-styrene rubber that was continuous in all but the initial or polymerization step. The press of time did not allow for considered, deliberate development of a continuous polymerization technique, with the result that the process that went into the standard government plants, although endowed with a considerable degree of continuity, was lacking in the one element that would streamline it from beginning to end.

In the standard process the batch polymerized latex was "blown down" to batch receivers and thence continuously through butadiene flash tanks, styrene recovery columns, antioxidant addition and latex storage tanks, coagulation, dewatering, grinding, drying, baling and packaging. Under these circumstances it is quite easy to see how desirable it was to impart complete continuity to the process so as to gain in capacity and uniformity of product.

In February, 1942, before any of the government plants had so much as turned a valve, a pilot plant project was under way looking toward the development of a practical method of continuous polymerization—practical, because the by now standardized plants were to utilize batch reactors, and any hope of "continuizing" the process had to contemplate the employment of the equipment then being installed, and not something different.

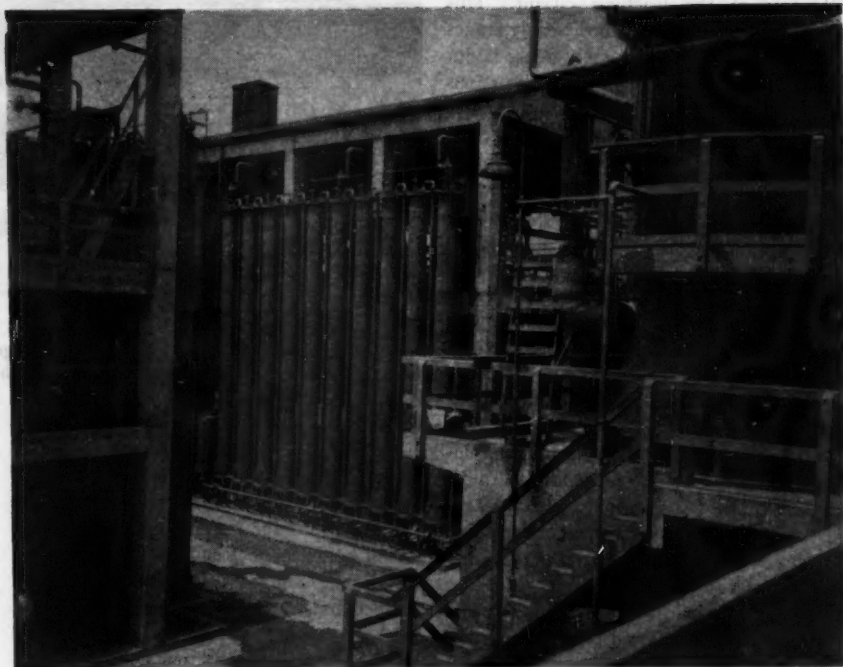


Fig. 1—Ten 30-ft. high displacement tubes at the end of the polymerization train hold the latex under conditions that favor the finishing up of incompletely reacted constituents.

Discarding theoretical considerations which dictated that a series of individual tanks, few in number, would give serious "short circuiting" of reactants, the development drive was put on design modifications which would lessen that factor and, if possible, lower it to a point that would permit operation within satisfactory specification ranges.

## FLEXIBILITY RETAINED

From this point on, the path of the continuously produced latex is identical with that of the batch produced material. The steps of monomer recovery, antioxidant addition, coagulation, dewatering, grinding, drying and baling are sequence steps and provide the continuity necessary to make the whole manufacturing process a continuous one, once the polymerization operation has been converted.

The conversion of batch reactor facilities to continuous does not involve a complete loss of flexibility as far as variety of copolymers is concerned, for it is always

possible to use the individual reactors in batch polymerizations through the provision of properly located valves and pipe "blinds" to permit quick changeover from continuous operation to batch, if such is desired.

This is of considerable significance to those units whose normal schedules call for the production of miscellaneous copolymers. It is possible in this case to produce substantial inventories of the continuously made GRS rubber and then revert to batchwise operation for the miscellany needed.

The advantages of continuous polymerization over the batch technique are very real and substantial and may be enumerated as follows:

1. Elimination of inhibition periods found in batch polymerizations through the maintenance of an oxygen-free system. Correlative to this is the further elimination of inhibitory trends through constant "seeding" of the incoming reactants by polymer already formed.

2. Considerable savings are effected in maintenance, in labor and in certain of the raw materials.

3. Monomer recovery operations are smoothed out through the application of a constant load on the system as compared to the surges of batchwise operation.

4. Peak demand for cooling water, a limitation in batch operation, levels off in continuous polymerization.

5. The full volumetric utilization of the reactors, combined with the elimination of "down time" for charging and discharging batchwise, yields an increase in plant capacity of between 50 and 60 per cent.

6. A polymer of good quality and improved uniformity is produced.

7. The complete changeover is readily and easily accomplished at a cost of about one per cent of the original capitalization of the plant.

Thus the development of continuous polymerization has enabled plans for greatly enlarged production schedules without the necessity of additional building construction or equipment installation. Present plans contemplate the conversion of approximately one third of the nation's GRS capacity to the continuous system. This should permit the production of all the synthetic rubber necessary to tide the nation over the next 12 to 18 months, during which time the replacement of the man-made product by natural rubber may

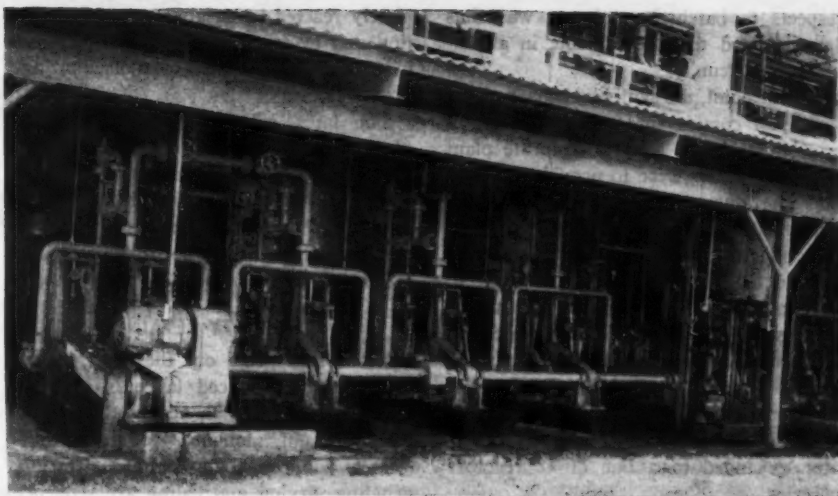


Fig. 2—Positive displacement pumps operating on a common shaft proportion reactant feeds.

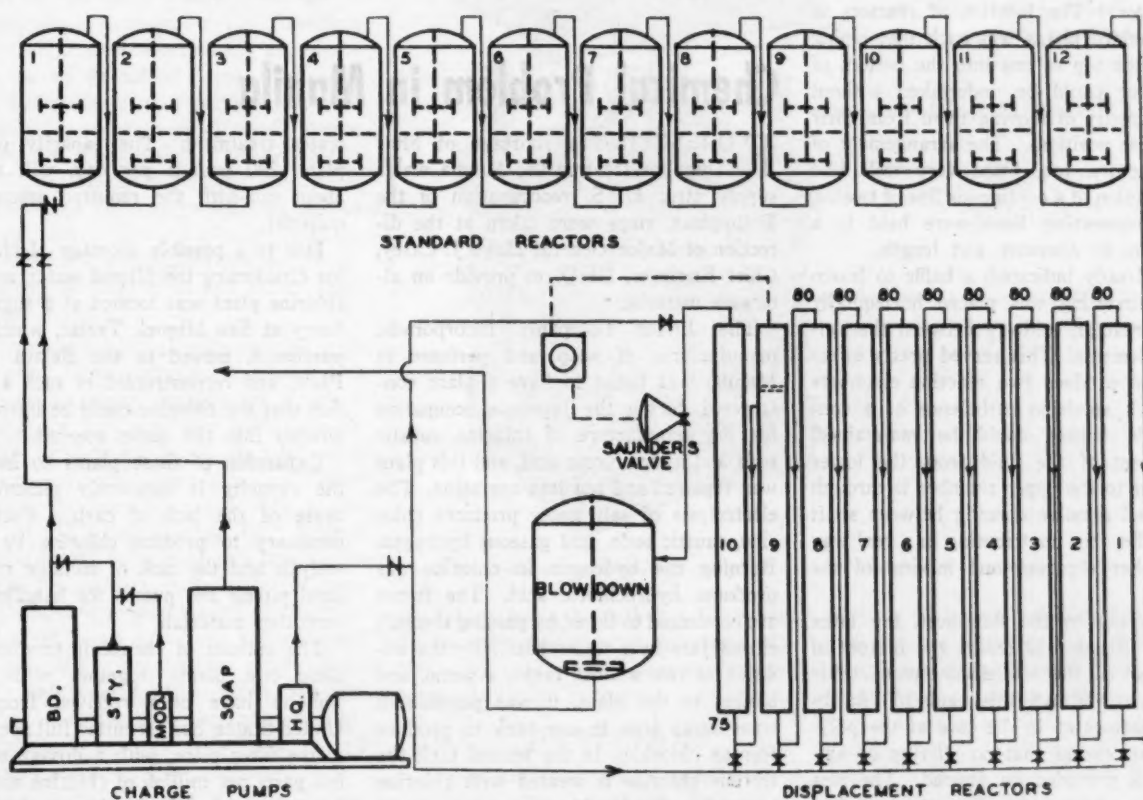
be expected to proceed on an accelerating schedule.

Accordingly, experimentation demonstrated that the addition of properly designed horizontal baffles placed between the agitator elements of the reactors had the effect of doubling the effective reaction chambers with resulting curtailment of "short circuiting." Further, the addition of displacement tubes (Fig. 1) to the end of the polymerization train aided materially in minimizing the effect on the finished product of under-reacted

polymer. In the displacement tubes, which follow the last reactor in the continuous series, the latex flows undisturbed, unagitated and is held under conditions which favor the "finishing up" of incompletely reacted constituents, to the end that the latex discharged from the last displacement tube is in a satisfactory state of polymerization.

Enough rubber was produced in the pilot plant equipment to obtain processing tests and to build tires and test them in the usual manner. A rubber equal in all

## CONTINUOUS POLYMERIZATION FLOW SHEET



respects to batchwise polymer was thus demonstrated to be obtainable in a continuous system.

At this point, the synthetic rubber plants were just coming into production and it was obviously no time to dislocate plant schedules which were to provide the considerable amounts of sorely needed GRS synthetic rubber. However, a year later, as production was more nearly meeting demand, Rubber Reserve Co. agreed to and gave considerable assistance in the conversion to continuous polymerization of a line of six reactors in the Goodyear-operated plant of Rubber Reserve at Houston, Texas. With the encouraging results from this unit in hand, it was later expanded to a line of 12 reactors in series.

#### HOW CONVERSION WAS MADE

The actual conversion of a bank of reactors from batchwise to continuous process was accomplished readily and easily as follows:

**Charging:** The reactants must be fed in correct proportions so as to maintain unvarying polymer constitution at all times. Thus a choice of proportioning devices must be made at this point. One possibility is positive displacement pumps operating on a common jack shaft, with speed control common to all the pumps. This equipment is illustrated in Fig. 2. Another suitable arrangement is the use of flow-controlling rotameters in conjunction with centrifugal pumps. Still another system, found highly practical, is to employ orifice flow controllers in connection with either centrifugal pumps or back-pressure controlled reciprocating pumps.

**Reactors:** The location of reactors in the standard plants was such that piping out of the top of one into the bottom of the other could be undertaken without any necessity of moving them from their batchwise positions. The arrangement of the reactors, too, fitted very well into the selection of a continuous line of twelve. Thus, connecting lines were held to a minimum in diameter and length.

As already indicated, a baffle to lessen short circuiting was placed horizontally in the reactor, midway between the agitator elements. This served pretty effectively to produce two reaction chambers in which emulsion turbulence of a considerable degree could be maintained. Movement of the fluid from the lower chamber to the upper chamber is through the small annular opening between shaft and baffle, thus contributing in a real way to further shearing and mixing of the system.

Referring to the flowsheet, the latex leaving Reactor 12 enters the bottom of the first of the ten displacement tubes and flows through this bank of "finishing" reactors as in the case of the polymerizers, except that no stirring or agitation is provided or desired. The idea here is to obtain streamline, non-turbulent flow so as to permit partially or incom-

pletely reacted materials to go to completion and to reach the end of the system in a satisfactory state of molecular aggregation.

The latex effluent from the last displacement tube passes through a pressure control valve with air-operated diaphragm, which serves to maintain the system at the desired pressure differentials and permits continuous and uniform "blow down" of latex to the monomer recovery system.

#### FLEXIBILITY RETAINED

From this point on, the path of the continuously produced latex is identical with that of the batch produced material. The steps of monomer recovery, antioxidant addition, coagulation, dewatering, grinding, drying and baling are sequence steps and provide the continuity necessary to make the whole manufacturing process a continuous one, once the polymerization operation has been converted.

The conversion of batch reactor facilities to continuous does not involve a complete loss of flexibility as far as variety of copolymers is concerned, for it is always possible to use the individual reactors in batch polymerizations through the provision of properly located valves and pipe "blinds" to permit quick changeover from continuous operation to batch, if such is desired.

This is of considerable significance to those units whose normal schedules call for the production of miscellaneous copolymers. It is possible in this case to produce substantial inventories of the continuously made GRS rubber and then revert to batchwise operation for the miscellany needed.

The advantages of continuous polymerization over the batch technique are very real and substantial and may be enumerated as follows:

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6. A polymer of good quality and improved uniformity is produced.

7. The complete changeover is readily and easily accomplished at a cost of about one per cent of the original capitalization of the plant.

Thus the development of continuous polymerization has enabled plans for greatly enlarged production schedules without the necessity of additional building construction or equipment installation. Present plans contemplate the conversion of approximately one third of the nation's GRS capacity to the continuous system.

## Chemical Problem in Manila

**F**ORESEEING a shortage of filter alum for treating the Manila water supply after U. S. reoccupation of the Philippines, steps were taken at the direction of Major General Hugh J. Casey, Chief Engineer, GHQ, to provide an alternate material.

The Lissar Compania Incorporada, manufacturer of soap and perfume in Manila, was found to have a plant constructed during the Japanese occupation for the manufacture of chlorine, caustic soda and hydrochloric acid, and this plant was repaired and put into operation. The electrolysis of salt water produces chlorine, caustic soda, and gaseous hydrogen. Burning the hydrogen in chlorine gas produces hydrochloric acid. The fumes are condensed to liquid by passing through closed jars in a water bath. By the addition of two wooden tanks, a pump, and blower to the plant, it was possible to treat scrap iron in one tank to produce ferrous chloride. In the second tank the ferrous chloride is treated with chlorine to produce ferric chloride, which can be substituted for alum as a coagulant in

water treatment. The capacity of the plant, 240 pounds per day, will supply about one-fifth the required amount of material.

Due to a possible shortage of chlorine for disinfecting the filtered water, another chlorine plant was located at a sugar refinery at San Miguel, Tarlac, which was purchased, moved to the Balara Filter Plant, and reconstructed in such a location that the chlorine could be introduced directly into the outlet conduit.

Expansion of these plants to increase the capacity is extremely difficult because of the lack of carbon electrodes necessary to produce chlorine by electrolysis and the lack of suitable rubber-lined piping and pumps for handling the corrosive materials.

The amount of chemicals produced by these two plants, together with what supplies have been received from the United States, has permitted full operation of the filter plant, with a dosage of two full parts per million of chlorine and sufficient coagulant to produce a clear and potable water for the City of Manila.

# PRESSURE CARBOY Approved For Liquid CHEMICALS\*

by M. F. CRASS, JR., Manufacturing Chemists' Assn.,  
Washington, D. C.

A NEW BOXED CARBOY, BUILT TO WITHSTAND an internal pressure of 10 pounds, has been approved by the I. C. C. for transportation of mineral acids. Its increasing use in the shipment of other liquid chemicals is foreseen.

**T**HE PURPOSE of this article is to report the development of a new boxed glass carboy package for shipping liquid chemicals—designed to withstand safely, and without venting, internal pressures up to 10 lbs. per sq. inch.

This container, consisting of a machine-made bottle of 6.5 gallons nominal capacity (7 gallons overflow), equipped with a plastic screw cap closure assembly and completely enclosed and cushioned in a protective wooden box, was developed by a subcommittee of the M.C.A. Glass and Wood Packages Committee with the assistance and cooperation of the Owens-Illinois Glass Company. Members of the M.C.A. subcommittee consisted of representatives of Merck & Co., Inc., General Chemical Company, E. I. du Pont de Nemours & Co., Pennsylvania Salt Manufacturing Company, and the Bureau of Explosives (Association of American Railroads). Authorization for use of the new carboy in sulfuric acid, nitric acid and hydrochloric acid service was contained in an order issued by the Interstate Commerce Commission (Docket 3666) dated June 29, 1945, covering issuance of Specification 1D, and paragraphs 263(a) (6) (b), 268(d) (2) and 272(e) (2) of the Commission's Regulations for the Transportation of Explosives and Other Dangerous Articles.

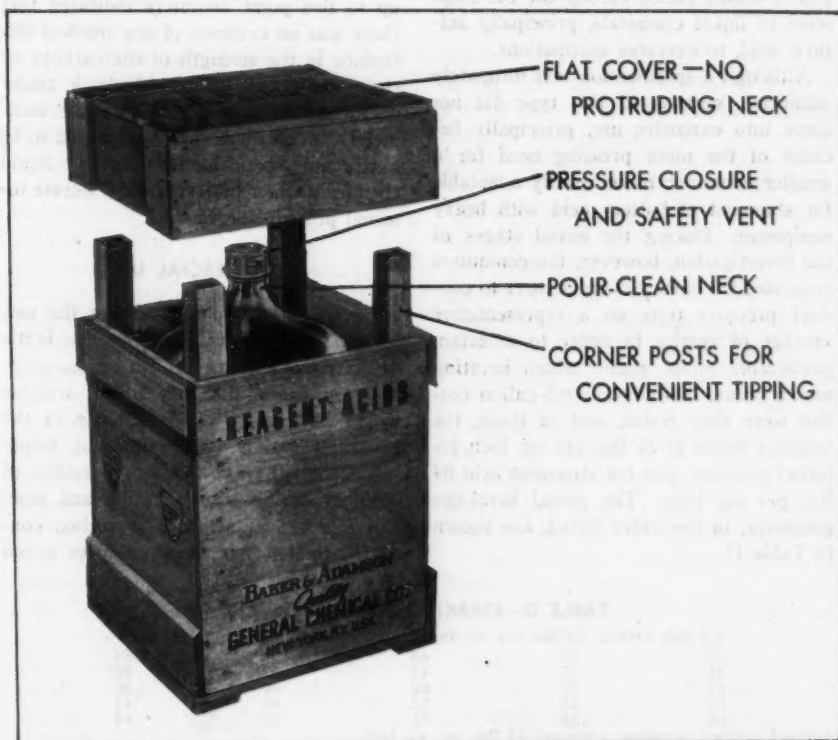
The chemical industry has shipped acids and other liquid chemicals in boxed glass carboys for many decades, the standard package of this type now being the 13-gallon hand-blown bottle enclosed in a wooden case and equipped with a vented closure, the assembly conforming in detail to ICC Specification 1A. Several million boxed carboys of this type are in use in this country, principally for commercial-grade products such as the mineral acids, acetic acid, aqua ammonia and formaldehyde. Substantial quantities of C.P. and reagent grade acids and ammonia have also been shipped in the 13-gallon carboy equipped with a ground glass stopper.

The newly developed 6.5-gallon package is in no sense a replacement for the

13-gallon carboy but is intended to be used in cases where maximum protection from product contamination is required and where light weight and ease of handling justify its additional cost. Because the new carboy represents a radical departure from previous practice, the committee requested that it be authorized for transporting only those products on which experimental work had been done and data obtained. Initial planning includes its use for C.P. grade of sulfuric, nitric and hydrochloric acids. In the non-

examples of this include carbonated beverages, hydrogen peroxide solutions, liquid or semi-liquid food products, etc. Solutions of sodium hypochlorite have been marketed for some time in glass bottles equipped with screw cap closures designed to release excessive internal pressures through the threads.

In the field of regulatory or dangerous articles, the regulations of the Interstate Commerce Commission have not heretofore recognized a glass container expressly designed to withstand low pressures, although shipment of products such as nitric acid, hydrochloric acid, and hydrogen peroxide—all having appreciable vapor pressures—has been authorized in sealed glass bottles of volume varying from 5



regulatory field, the carboy will be used for packaging ammonium hydroxide, glacial acetic acid, and perhaps other liquid products of high purity.

## FORERUNNERS

Ample precedent exists for shipment of liquids in glass containers designed to withstand nominal pressures. Everyday

pints, in the case of nitric acid of not over 1.49 sp. gr., to 1 gallon for hydrogen peroxide and 3 gallons for hydrochloric acid. Table I shows resultant outward pressure on walls of 5-pint bottles containing certain liquid chemicals, at temperatures of 104° F. and 149° F.

The transportation record of such shipments has justified the use of properly

cushioned glass bottles for these products when contained in authorized wooden boxes or cases.

working pressure would therefore be 11.7 to 14 lbs. per sq. inch.

An additional 60 bottles were later sub-

**TABLE I—PRESSURES DEVELOPED IN 5-PINT BOTTLES**  
(Loading temperature, 50° F., at sea level)

Product	Net contents, lbs.	Outage in bottle at loading temperature, per cent	Internal pressure at sea level pounds per sq. inch	
			at 104° F.	at 149° F.
Aqua Ammonia, 28%	4	19.3	7.3	35.0
Sulfuric Acid, 93-98%	9	11.3	3.9	8.3
Nitric Acid, 70%	7	10.6	8.8	25.0
Hydrochloric Acid, 38%	6	8.5	14.0	37.0

<sup>1</sup> From laboratory of a member producer.

Use of completely sealed glass containers of larger size began in 1939, when Merck & Co., Inc., began shipping ammonium hydroxide and other non-regulatory liquids in small carboys equipped with Bakelite screw caps and wax-impregnated Saran or glass cloth liners. Although venting closures were not used, no complaints were received involving the bursting or failure of these carboys due to the development of internal pressure. This record is significant, in view of the fact that 28% ammonium hydroxide develops a vapor pressure of 23.5 lbs. per sq. inch gauge, at 130° F.

#### WAR DEVELOPMENT

In July 1943, the M. C. A. Carboy Committee was invited by the Armed Services to assist in the development of a completely-sealed boxed carboy for the shipment of liquid chemicals, principally sulfuric acid, to overseas destinations.

Although a specification was ultimately submitted, carboys of this type did not come into extensive use, principally because of the more pressing need for a smaller container more readily adaptable for shipment of battery acid with heavy equipment. During the initial stages of the investigation, however, the committee requested the carboy manufacturer to conduct pressure tests on a representative number of bottles in order to ascertain predictable limits within which bursting would occur. Twenty-five 6.5-gallon bottles were duly tested, and of these, the weakest broke at 35 lbs. per sq. inch internal pressure, and the strongest held 84 lbs. per sq. inch. The actual breakage pressures, in the order tested, are shown in Table II.

**TABLE II—BREAKING POINT PRESSURES**

6.5 gal. carboy, in lbs. per sq. inch (pressures sustained for 1 minute)				
38	50	63	54	84
35	75	45	39	80
63	37	62	40	38
50	65	52	49	43
45	50	55	42	45

Average internal breaking pressure: 52 lbs. per sq. inch.

In submitting the above figures, the bottle manufacturer stated that no guarantee could be made that no comparable bottle would break at a level below 35 lbs. per sq. inch, and suggested that a safety factor of 2½ or 3, applied to the weakest unit, be set as a maximum working pressure. On the basis of the 25 carboys tested, the weakest of which broke at 35 lbs., the recommended safe maximum

jected to instantaneous pressure tests, the strongest breaking at 78 lbs. and the weakest at 40 lbs. pressure, with an average breaking pressure of 55 lbs.

Subsequent tests were run on 20 carboy bottles under vacuum, the bottles being subjected to 28 inches of vacuum for 6 hours, followed by an additional 12 hours under 26 inches vacuum. None of the units suffered any damage during this test.

In order to evaluate the effect of transportation shocks upon bottles subjected to internal pressure or vacuum, the committee subjected 10 carboys under 28 inches vacuum, and an equal number under 20 lbs. per sq. inch internal pressure, to successive swing tests<sup>1</sup> at 55, 65 and 75 inches without breakage. These carboys, filled with 55 lbs. of water, were tested in conjunction with an equal number of blanks at atmospheric pressure. Results up to this point definitely indicated that there was no evidence of any marked difference in the strength of the carboys or their ability to withstand shock under operating conditions, and that the completely sealed small carboy appeared to be a safe and practicable container for liquid chemicals when subjected to moderate internal pressure or vacuum.

#### COMMERCIAL USE

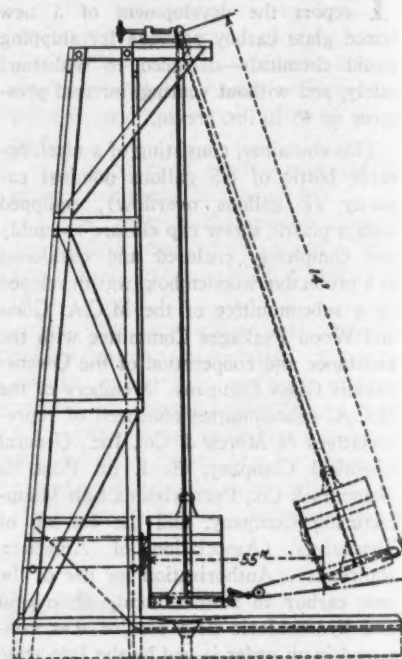
As the first step in adapting the new carboy to commercial practice, the bottle capacity was increased to 7.0 gallons overflow, in order that net filling weights would be exactly one-half those of the 13-gallon carboy, with sufficient empty space (outage) allowed for expansion of contents during transportation and storage. Experimental work was then conducted to determine the pressures which

ditions. The method employed consisted of slowly heating the filled container and recording the pressures observed over the temperature range utilized. Among the results obtained were the following:

(1) Sulfuric acid, 1.835 sp. gr. (93.19%). Pressure developed at 130° F. was well under safe operating pressure. This product developed an internal pressure of only 4.59 lbs. per sq. inch at 160° F. during the test. Outage within bottle decreased from 6.2 in. at 60° F. to 5.6 in. at 160° F., a decrease of only .6 inch.

(2) Hydrochloric acid, 35.63%. With an original filling density of 95% at 64° F., a pressure of 12.3 lbs. per sq. inch was observed at 130° F.

(3) Nitric acid, 70%. With an original filling density of 91.8% at 60° F., a pressure of 14.5 lbs. per sq. inch was noted.



**Standard ICC Swing Testing Machine**

With 70.3% acid, filled to 93.5% bottle capacity at 69° F., the pressure increased to 18.4 lbs. per sq. inch at 130° F.

Although the experimental pressures in each case were somewhat lower than calculated pressures, it was evident that possible pressures within carboy bottles at advanced temperatures were in excess of the operating pressures recommended by the carboy manufacturer for bottles of the type currently manufactured. Hence, it was necessary either to (1) increase the structural strength of the bottle to a point where a safe operating pressure of about 20 lbs. per sq. inch could be expected, still maintaining the 2½ or 3 to 1 safety factor, or (2) utilize a closure which would vent pressures in excess of a stipulated amount, in this case approximately 10 lbs. per sq. inch.

In order thoroughly to explore the possibility of increasing the structural strength, the Owens-Illinois Glass Com-

<sup>1</sup> Standard ICC swing test. The carboy swing testing machine in the illustration is so designed that carboys subjected to a 55-inch swing will receive a shock comparable to a collision shock speed of 8 m.p.h. in transit. Carboys must be tested twice a year in accordance with ICC requirements.

pany prepared and tested a variety of carboy bottles embodying altered construction features, taking the following factors into consideration during this work:

- (1) Glass wall thickness
- (2) Annealing
- (3) Physical dimension variations
- (4) Capacity variation
- (5) Effect of surface treatment
- (6) Impact strength
- (7) Operational characteristics
- (8) General uniformity
- (9) Internal pressures

None of the experimental changes resulted in any improvement over bottles made from the original 6.5-gallon mold, and it was then decided to standardize on this type, and to develop a closure which would vent at the desired pressure. It was necessary, however, to evaluate ability of the bottles to withstand sustained pressures over extended periods of time, and tests were conducted with the following results.

(1) Twenty bottles held at 20 lbs. per sq. inch internal pressure for two weeks and then subjected to instantaneous pressure test. The average breaking pressure was 61 lbs., the weakest breaking at 42 lbs. and the strongest at 74 lbs. pressure.

(2) Twenty bottles held at 20 lbs. per sq. inch internal pressure for one week and then subjected to instantaneous pressure test. Average breakage occurred at 54 lbs., strongest at 68 lbs., weakest at 38 lbs.

(3) Twenty-five bottles held at 22 lbs. per sq. inch for 24 hours prior to instantaneous pressure test. The average breaking pressure was 55 lbs., the strongest breaking at 70 lbs., the weakest breaking at 38 lbs.

These tests indicated ability of the bottles to withstand sustained pressures over long periods of time. Additional tests showed, however, that bottles held at 25 and 30 lbs. per sq. inch were not as capable of withstanding sustained pressures as those held at 20 lbs. Bottles have been held at the latter pressure for periods up to 4½ months, without failures.

Specification for the bottle was set up as follows:

Diameter:  $12\frac{1}{32}'' \pm \frac{1}{16}''$ , — $\frac{1}{16}''$   
 Height:  $20\frac{1}{32}'' \pm \frac{1}{16}''$   
 Overflow capacity: 7 gal.  $\pm$  10 oz.  
 Weight: 14 lbs.,  $\pm$  16 oz., —8 oz.  
 Glass wall thickness: .075" min.  
 Filling point: 6.5 gal.  
 Finish: 53 m.m. OIG. 189—std. tolerances (GCA)

Testing requirements set up in the ICC Specification [paragraphs 9(g) and (h)] require that (1) bottles shall be capable of withstanding a sustained internal pressure of 20 lbs. per sq. inch gauge for a 15-day period and bottle manufacturer must demonstrate to the Bureau of Explosives that bottles of a proposed design will meet this test prior to start of production; and (2) one bottle selected at random from each 200 produced on each mold shall be subjected to an instantaneous hydrostatic pressure test to bursting. Pressure at which bottle bursts must be not less than 40 lbs. per sq. inch gauge. If bottle so tested fails at a pressure less

than 40 lbs., 12 additional bottles must be selected from the same lot of 200 bottles and tested in the same manner. All 12 samples must pass required test, otherwise entire lot shall be rejected. In addition, the boxed assembly must be capable of withstanding periodic swing tests as required under ICC Specification 1A.

## CLOSURE

A molded polystyrene screw cap was selected for use, because of the following characteristics: (1) definite resistance to attack by the principal acids, (2) mechanical strength and ability to withstand substantial temperature changes while under tensions, and (3) attractive appearance.

Strength of caps fabricated of polystyrene was investigated prior to adoption. This was accomplished by tightly applying the caps to glass bottles at room temperature, utilizing a measured torque, then storing overnight at temperatures ranging from +10° F. to —30° F. Liners of waxed Saran cloth or of polyethylene were used in these tests. Although some caps of an earlier design showed a certain amount of breakage when subjected to this test, no breakage occurred with caps of the improved design, demonstrating stability of the closure under stress and abnormal temperature conditions.

In order to incorporate a venting feature in the closure cap, designed to release internal pressures in excess of 10 lbs. per sq. inch, various methods were tried out by the closure manufacturer before adoption of a polyethylene disc was decided upon. In any event, supplementary methods could be depended upon to control internal pressures, such as controlled outage within bottle, and filling under vacuum.

Venting of screw cap closures is a well-established practice, particularly in the field of products such as small package sodium hypochlorite, and vents employing the "bunsen valve" device or resilient-type gaskets have been successfully employed to release pressures before they become dangerous. The venting of such bottles is obtained by providing a recess in the top of the closure cap, so that when

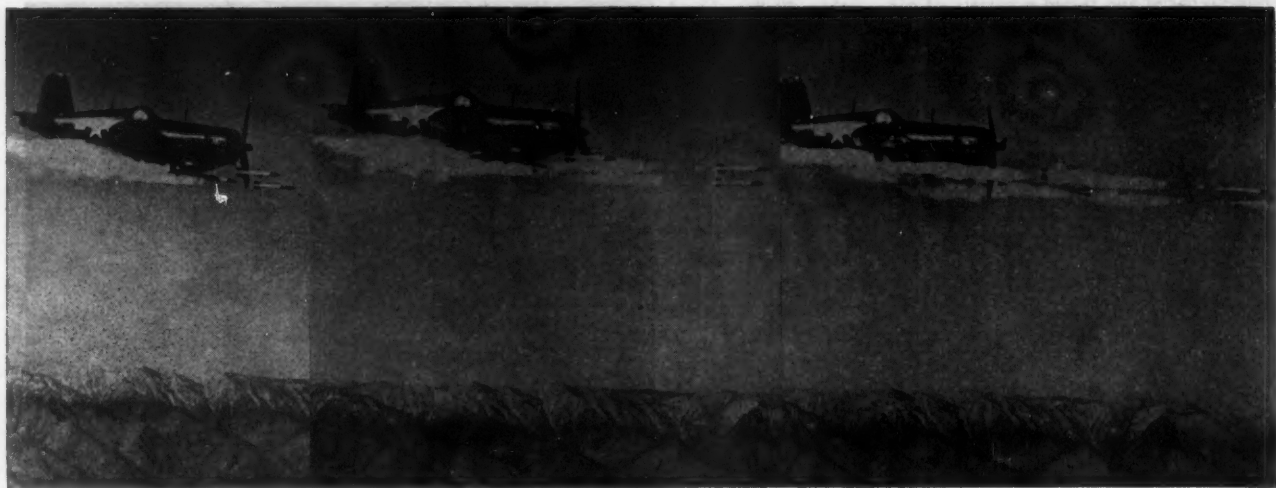


The corner post provides a convenient handle so that one man can handle the carboy. Also, since there is no protruding neck, boxes can be piled one on top of the other for more convenient storage.

an excessive pressure develops within the bottle, the liner is pushed up into the recess, the pressure then being dissipated through the threads of the closure. Successful operation of such a vent in the case of a product which might conceivably develop unpredictably high pressures because of product decomposition offered a solution in the case of products such as the mineral acids, the pressures of which are definitely predictable at given temperatures.

Venting characteristics of various types of lining materials were then studied in order to provide a predictable arrangement that would vent at a prescribed pressure. Tests were made, using neck sections cut from carboys into the under part of which were cemented single-hole rubber stoppers. Caps with experimental liners were then applied with measured tightness and suitable connection made to the compressed air line, after which the sealed assemblies were immersed in a water bath at known temperature. Air pressure was then applied gradually until venting occurred, as observed by the escape of bubbles from around the closure threads. Pressure was then increased according to several different methods, and after venting had attained a stipulated rate (such as 50 cc or more of air per minute) the air line was shut off until the rate of venting had decreased to one bubble or less per minute. Results

(Turn to page 708)



High-speed photographs show rockets being fired from plane in salvos of two.

# The Story of Rocket Development

by RANDALL D. SHEELINE, Bureau of Ordnance  
U. S. Navy, Washington, D. C.

(Official U. S. Navy and NDRC Photographs)

**THE ROCKET IS HARDLY A MODERN weapon.** It is actually about a century older than the gun and for many years has been its chief potential rival. The emergence of modern rockets from the crude devices of several years ago has involved the solution of many chemical as well as mechanical problems. Chemical research on improved propellants has played a large role.

**T**HE ROMANCE of rocket development is real. An unknown inventor made the first attempt at human flight using rocket power before the Mandarin Wan-Hu in about the year 1500. A double kite-like structure, held together by an open framework, mounted 47 rockets which were fired by 47 coolies. Alas, the kites and coolies all disappeared in the resulting explosion!

In 1668, a 120-pound rocket carrying a bomb was successfully operated near Berlin. This, it is believed, was the first military rocket built in Europe.

Colonel William Congreve, while fighting the Indian wars, made his first acquaintance with rockets in 1799. The Indians used a corps of 5,000 rocket throwers, and this corps was used with good effect against Congreve's cavalry. Back in England Congreve studied the rocket and substituted a metal powder container for the paper one previously used. The rocket was improved to such an extent that England used rockets in 1806 against the armies of Europe. Bologne, Danzig and other cities were fired in 1813, and Copenhagen was set completely afire with 40,000 rockets. Naturally, all the armies of Europe developed rocket corps, but the rockets were essentially Congreve rockets fired

from earthen works, cannon-like copper tubes, or ladder structures. At the time of his death Congreve was designing 500- and 1,000-pound rocket projectiles.

British rockets of 1870 may be regarded as representing the highest development of the rocket during the 19th century. A typical rocket weighed 24 pounds, was about 2 feet long, 4 inches in diameter and was enclosed in a metal container. It carried three pounds of wet guncotton as a bursting charge and nine and a half pounds of black powder as the propellant. The range of such a rocket averaged about 2,000 yards, although twice that range was at times attained.

Because of the development of smokeless powder and more accurate and powerful guns, the rocket was abandoned for war purposes late in the 19th century. During World War I the United States and some of the other belligerents experimented with the idea of employing war rockets, but a successful rocket weapon did not appear on the battlefield.

## FIRST-WAR AFTERMATH

Following the first World War experimentation on rockets was carried on in several countries. Development of modern rockets and jet propulsion prob-

ably stems from pre-World War II activities of privately endowed research and various rocket societies throughout the world.

In 1919 Dr. Robert H. Goddard published, in the Smithsonian Institute Miscellaneous Collection, the first complete mathematical and experimental treatment of jet propulsion, a compilation of the results of his work of previous years. On March 16, 1926, Dr. Goddard successfully flew a rocket powered with liquid oxygen and gasoline instead of the time honored powder fuel. Reports compiled by Dr. Goddard on his rocket research between 1930 and 1935 showed that his rockets were far in advance of anything previously developed elsewhere.

It was apparent from the post-World War I international rocket experimentation that a strong homogeneous propellant would be required to stand up under the stresses imposed by the high velocities required for modern war use. For this purpose a colloided double-base (nitrocellulose-nitroglycerine) propellant, such as had been used for large-caliber cannon, held most promise. This type of material would give a high specific impulse and could be manufactured with enough nitroglycerine to plasticize the nitrocellulose without requiring the use of volatile solvents or large amounts of inert plasticizers. The latter was an important consideration, for some rocket propellants are made in units large in cross-section when compared to cannon propellants. The time required to dry out the volatiles from these units would be too long to be practicable.

Since the first World War British manufacturers have worked to develop a process for the manufacture of large sticks of propellants similar in composition to British "cordite" cannon powder. By the time World War II started, the process for extruding large-size rocket propellants from solventless compositions had been so developed that it was not too difficult to change from the manufacture of cannon to rocket propellant.

When experimental work in this country on war rockets was initiated by the armed forces, a choice had to be made between the manufacture and use of British powder, or the development of a new or modified propellant of our own. The British powder contained a relatively high amount of a low-energy-content material as a plasticizer and stabilizer which made the powder relatively low in potential. It was therefore decided to work on a composition containing little or no plasticizer and a high percentage of nitroglycerine, itself a good colloiding agent, in order to obtain as great a specific impulse as possible.

#### THE NDRC

Rocket research, conducted under the National Defense Research Committee, was divided early into two groups. The Western Group had its headquarters at the California Institute of Technology and most of its work has been done for the Navy. The Eastern group was originally located at the Naval Powder Factory, Indianhead, Md., and the greater portion of its work was connected with the development of Army rockets. This formed the nucleus of the Allegany Ballistic Laboratory in Cumberland, Maryland. They have worked with powder manufactured by the solvent process, following the procedure used in the manufacture of cannon powder. While this method prohibited the use of propellant grains of large cross-sections, the smaller cross-sectioned powder had advantages in that facilities were readily available for the manufacture of large quantities of this type of powder, and in that such propellants with small "webs" (cross-sections) were quicker burning. This was an important feature in weapons like the "bazooka." In these burning is completed in the launcher tube, not only to prevent the operator from being burned by the flame but also to give improved accuracy to the projectile. A quick burning propellant, which causes a rocket to reach, or nearly reach, its maximum velocity before it leaves its launching guide, aids in improving the accuracy of a rocket fired from a stationary launcher since fins of practical size do not exert appreciable restoring forces on the projectile except at relatively high velocities.

The research group on the West coast based its work on the use of solventless sheet powder, which was similar to the propellant used for trench mortars and

also similar in composition to the propellant used by the Eastern group except that it was solventless. Limited quantities were readily available and large grains could be successfully extruded from "carpet rolls" of this material without the use of solvents.

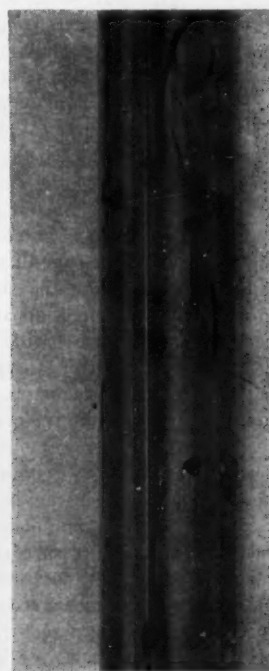
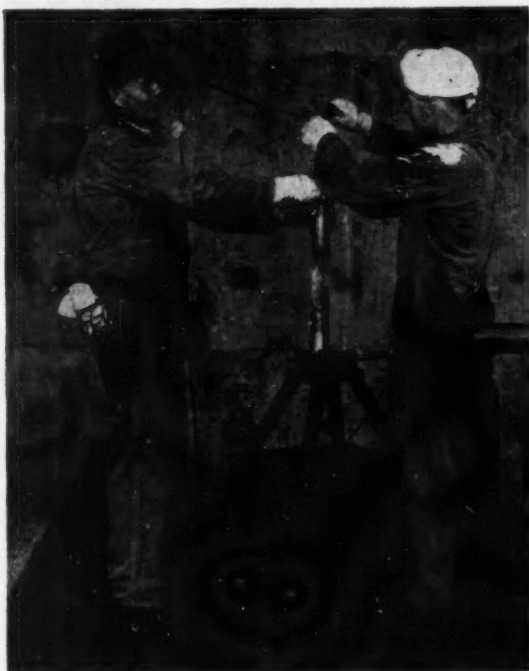
One of the first problems undertaken by the California Institute of Technology for the Navy was the development of rockets for projection from surface craft. As these rockets were to be fired from comparatively small ships, it was necessary to design the rocket motors so that they would have a low blast effect in order to prevent damage to the ship and its personnel. Large, slow burning propellant sticks served the purpose of getting the rockets away from the ship with little blast.

#### PIGMENTS FOR UNIFORMITY

It was early found that under certain conditions some erratic results were obtained with these compositions. A study of this problem led to the discovery of a very interesting phenomenon. Partially burned propellant sticks showed fissures and "wormholes," both evidences of uneven burning. It was found that this erratic burning could be reduced by exposing the powder sheets to the sun. This powder contained the common stabilizing agent, diphenylamine, and the sunlight, by causing a partial decomposition of this compound, darkened the sheets. In order to determine whether the color was producing more uniform performance or whether this uniformity was due to some other cause, a dark pigment was added to the powder composition and the sunning was omitted. The

pigment worked. Its results were even better than those given by irradiated sheets. Here is the explanation of this effect: Consider a stick of propellant burning in a rocket. The temperature of the powder surface which is about to burn must be raised above its ignition point. This is accomplished primarily by conduction and radiation of heat from the flame. To be effective in heating the powder, the radiation must be absorbed, and this is favored by the presence of a dark pigment. In a perfectly transparent propellant, there would be no radiation effect. There are always small particles of uncolloided materials, which will absorb sufficient heat to ignite the propellant well below the burning surface. This results in the development of small fissures which rapidly become larger as burning progresses. These fissures eventually communicate with the outside of the grain and increase its burning area, resulting in the erratic functioning of the rocket. On the other hand, the inclusion of a pigment in the propellant prevents the subsurface layers from absorbing radiant heat and uniform burning is attained.

It has long been known that salts of an alkali metal added to smokeless powder tend to give reduced flashes when fired from cannon. It was found that the use of such a salt in rocket propellants tended not only to decrease the intensity of the rocket flame, but also to improve certain burning characteristics. It is theorized that the beneficial effects of these salts result from the increased radiant heat of the flame due to the presence of incandescent salt particles. In general, potassium salts are now included in most rocket propellants. They are used for



Partial burning equipment consists of rocket motor with diaphragm at one end. At a predetermined pressure the diaphragm ruptures and the partially burned grain is ejected into water. At the right is a partially burned rocket propellant grain showing "wormholes."



Examination by X-rays of rocket propellant grains for fissures or other flaws.

such purposes because of their low hygroscopicity.

#### GRAIN DESIGN

The California Institute of Technology made use of a grain design which was a modification of the British rocket propellant grain shape. This was particularly well suited for use with solventless powder. These grains are extruded to fit snugly in the motor tube and then are cut to required lengths. Some types of grains are extruded as large cylinders with single longitudinal perforations running through their centers. The Eastern group, limited to comparatively small cross-sections by their use of solvent type powder, worked with multiple grain charges in their rocket motor design. These grains, extruded as single perforated cylinders several inches long and an inch or less in diameter, are generally supported in the rocket motor by threading them on a wire cage-like support.

In connection with the shape of these propellant grains, it is apparent that the perforated cylinders will maintain a nearly constant burning area; for as the outer surface area decreases during burning, the surface of the perforation through the center of the grain increases. This is desirable as it results in constant pressure functioning of the rocket and eliminates inefficient overdesigning of the motor tube based on a peak pressure rather than a constant maximum pressure. However, in order to use more economically the space within a given motor tube, grains of other cross sections, designed to burn inward from their outer surface, have been developed. With any design of an inward burning grain, it can be geomet-

rically shown that the burning area must decrease as unrestricted burning progresses. In order to avoid regressive burning, it is necessary to inhibit certain surface areas of this form of propellant. This is accomplished by covering these areas with an inert or very slow burning material.

#### FIN VS. SPIN

Early in 1943 the first reports were received from the California Institute of Technology on aircraft forward-firing rockets. While these were based on the British design, they contained the higher potential American powder and a lighter explosive head which, together, gave increased velocity, accuracy, and range. By the summer of 1943 production models of a 6½ foot launching rail with a T-slot were being installed on aircraft. These first aircraft rockets were primarily for use in attacks against light enemy shipping. In October of the same year work began to show promise for the elimination of the 6½ foot launching rails and replacement by "zero length" launchers. The zero length launchers consisted of two simple posts protruding downward from the under surface of a wing attached fore and aft on the rocket. Forward motion of less than an inch, in relation to the plane, freed the rocket from this type of launcher. Here, contrary to the requirements of rockets projected from stationary launchers, it was found that guide rails on rapidly moving planes were unnecessary for forward firing of rockets as the air flow over the tail fins of the rocket kept it in line. The effect of air speed in giving a very stable flight at the beginning makes launching from aircraft

comparatively more accurate than launching from the ground. The dispersion of rockets fired from aircraft actually approaches that obtained by ammunition fired from guns. An additional advantage of the zero length launchers is that no cumbersome structures remain attached to the plane to decrease its maneuverability. The speed of a fast moving airplane, when added to the velocity imparted to a rocket by its propellant, makes the rocket a real, hard-hitting weapon. A single fighter plane loaded with rockets can deliver fire power equivalent to a full salvo from a destroyer.

The stabilization of rockets in flight is not, however, limited to the use of fins. Just as a projectile shot from a gun is stabilized by rotation imparted to it by the rifling in the barrel, rocket projectiles, too, can be designed to be spin stabilized. This is ordinarily accomplished by the use of several nozzles, mounted circularly on the nozzle plate and canted at about 10° so that rotation is imparted to the rocket when it is fired. The use of spin provides a number of advantages for rockets, especially when used for ground or amphibious operations. Because of the gyroscopic action and the fact that the forces tending to produce deviation in flight are cancelled out to a considerable extent by the rotation, spinning rockets are, in general, more accurate than the corresponding fin stabilized rockets. Since no fins are required, and since the projectiles are made short and stubby, they are more convenient to handle and permit the use of more compact launching gear.

#### THE BAZOOKA

In May of 1942 the first bazooka round was fired from a man's shoulder. The bazooka was the result of a program initiated to develop a means of projecting a special type of anti-tank grenade. This grenade was very effective in penetrating armor, but it could not be fired practically from a rifle or machine gun because of heavy recoil. By employing a small rocket motor to propel this grenade the powerful, mobile anti-tank bazooka was evolved.

Even before the bazooka made its successful appearance, development of a larger and more powerful weapon had been initiated by the Army. A current story relates that, in order to avoid time consuming delays, the personnel working on this project tore apart an ordinary carbon dioxide fire-extinguisher and used its pressure chamber for preliminary tests. Thus the common fire-extinguisher became the forerunner of the Army 4.5" Rocket.

#### CHROMATOGRAPHIC ANALYSIS

Along with the development of propellants for rockets, advances were made in the field of chemical analysis and tests. Quantitative and qualitative analysis of

the ingredients of propellants by chromatographic separation has been developed to a high degree, and stability tests have been devised and improved. Chromatographic analysis was originated by a Russian botanist, Tswett, in 1906. Because this method of analysis is somewhat unusual, a brief description will be of interest. The method is based on the separation of the constituents of a solution by its unidirectional flow through a column of adsorbent. The chromatographic column is formed by pouring a slurry of the adsorbent into a convenient-sized cylindrical glass tube, an average size tube being about one inch in diameter and ten inches long. The adsorbent is packed by strong suction into a solid column, resting on a plug of cotton in the bottom of the tube.

After the column has been prepared, the mixture to be analyzed is dissolved in a small volume of some selected solvent from which the substances will be strongly adsorbed. The solution is poured upon the adsorbent and drawn by continuous suction into the column. Upon the subsequent addition of portions of the same or of a different solvent, the adsorbed substances migrate slowly at rates which depend upon their respective adsorption affinities. When the procedure is completed the various solutes are distributed throughout the adsorbent in a series of well-defined zones, separated from each other by portions of the column which are free of adsorbed material. The most strongly adsorbed substance will be nearest the top and the most weakly adsorbed nearest the bottom of the column. After removal of the column from the tube, the various zones are cut from the column and the individual zones are transferred to separate flasks and covered with an eluting agent which removes the adsorbed material from the adsorbent. The resulting solution is separated from the adsorbent by filtration.

Among other uses, chromatographic separation has been of great value in stability studies of propellants. Decomposition of a propellant may be measured by the determination of changes in its stabilizer. The stabilizer is usually present to the extent of about 1 per cent, and obviously its decomposition products would be hard to separate and analyze. But at least eighteen derivatives of diphenylamine have been separated by chromatographic means, and considerable information has been obtained to show the mechanism of powder aging.

#### IGNITERS

Smokeless powder is not easy to ignite; neither shock nor heat will easily initiate burning. However, the propellant of a rocket must be consistently and completely ignited within the space of a very few milliseconds. Such ignition is particularly important when rockets are fired from planes, because an appreciable delay

in getting the rockets away would cause the rocket to overshoot its target.

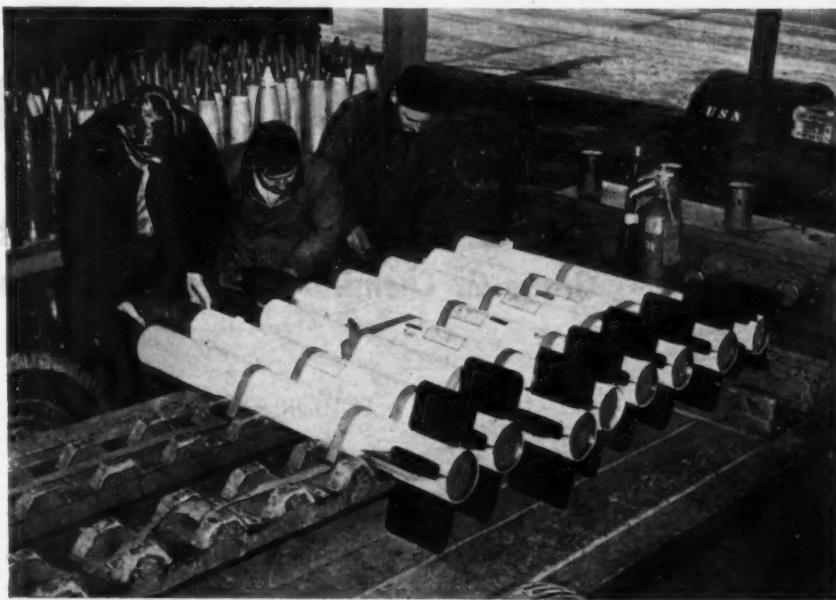
In order properly to ignite the rocket, black powder in a container within the rocket motor is inflamed by the spit from an electric squib. The black powder is hygroscopic, and, in order to keep it dry for proper functioning, it must be sealed in a moisture proof container. The first Navy igniters employed a container made of brass crimped over a cellulose acetate cover. It was found difficult to form a permanent water tight seal between the brass and the plastic. Later, igniters were molded entirely of cellulose acetate with threads molded directly into the cover and the case. This, with the use of cement, provided a snug, watertight, screw fit. It was found, however, that the cellulose acetate absorbed large quantities of nitroglycerine from the propellant and softened considerably. A number of tests were conducted on various plastic compositions in order to find a suitable material which had low nitroglycerine absorption. Certain ethyl cellulose formulations were found to have this desirable property, and this material has now

replaced most of the cellulose acetate. Another material which has come into wide use for igniter cases is tin-plated sheet metal.

Difficulties with some of the first igniters were traced to the wick-like action of the fabric insulation on the lead wires coming from the squib. Moisture traveled via the insulation into the match composition of the squib and desensitized it. This was corrected by the use of a plastic insulation.

#### JUST THE BEGINNING

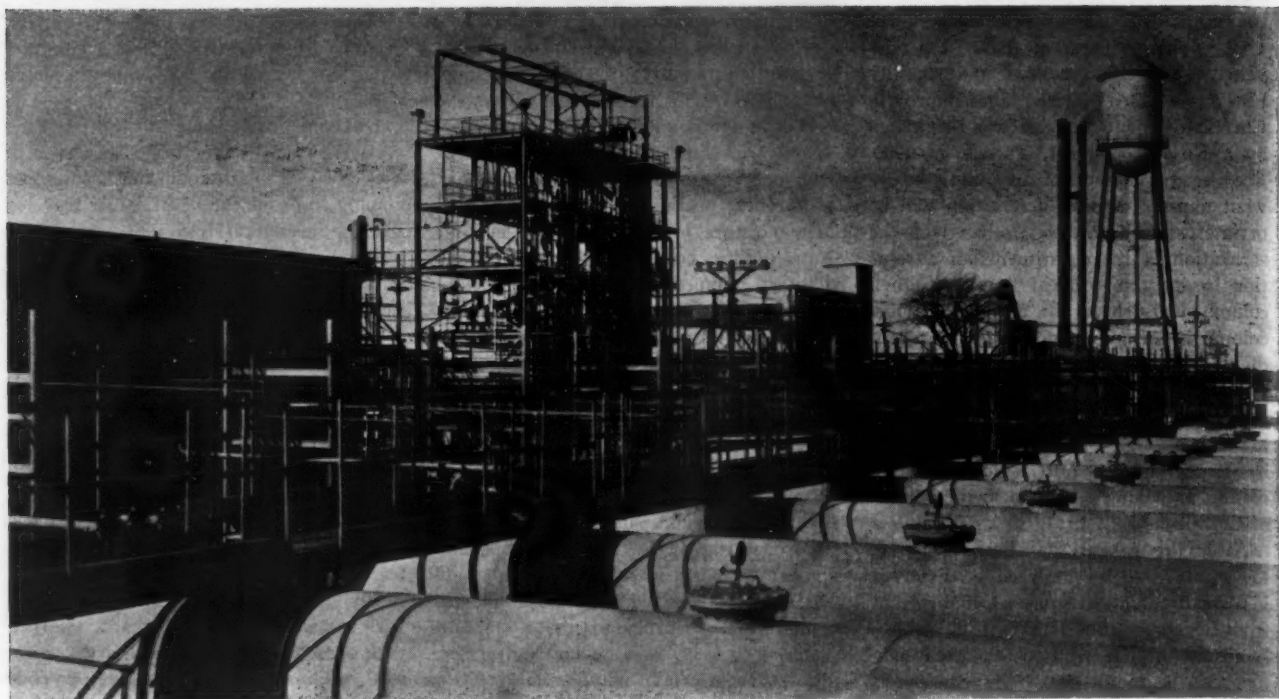
For security reasons this article has necessarily omitted many very interesting problems. It is to be pointed out that military rockets are undergoing improvement at the present time. The excellent cooperation between the activities under the National Defense Research Committee, the Navy Bureau of Ordnance, the Army Ordnance Department, and the various industrial concerns concerned with the development of military rockets to their present stage is expected to continue, with the commendable result of improving our preparedness.



Explosive heads are screwed on to assembled rocket motors and fins at a California field.



Flight of a rocket photographed with the "ribbon frame camera." Note that the distance traveled by the rocket increases in successive frames, showing the increase in velocity.



Raw material and product storage tanks provide the foreground for a view of the first plant for the exclusive production of industrial chemicals and resins derived from silica, designed and built by the Dow-Corning Corp.

## SILICONE SUMMARY

### Here Is The Status Of This Much Publicized New Group Of Chemical Materials As It Appears Today

#### EDITORIAL STAFF REPORT

THE SILICONES ARE OF INTEREST to the chemical industry not only because they represent an entirely new class of industrial chemical compounds but also because of their possibilities as temperature-resistant heat transfer media, surface-active agents, special lubricants, and for the preparation of gaskets, all of which can stand temperatures approaching 250 degrees C.

**W**HEN fibrous glass was first suggested for use as an insulating material in electric motors, it soon became evident that in order to get full realization of the extremely high heat resistance of the material it was going to be necessary to develop new insulating varnishes with a much higher order of temperature stability than was obtainable with the then known organic materials. This need, along with the desire to find a suitable cement for glass bricks, was the leading motivating influence in the development

(The foregoing article is based on interviews with members of the staff of the Dow-Corning Corp. at Midland, Michigan.—Editor.)

of the new class of high-polymeric materials that are now generally termed "silicones." These compounds of silicon and oxygen contain hydrocarbon-groups, bound directly to silicon atoms. Although they were originally developed for the solution of certain specific problems, they now constitute a completely new series of materials which have solved many other problems where service demands were above the range of organic plastics.

#### PREPARATION

Silicones may be said to be derived basically from sand, brine, and petroleum, but the raw material used for their final

synthesis is silicon tetrachloride. In the process of manufacture, one or more of the chlorine atoms of the silicon tetrachloride is replaced by use of a Grignard reagent prepared from metallic magnesium and a hydrocarbon halide. It is of interest to note that this reaction was applied to the preparation of carbon-to-silicon linkages by Professor Kipping as early as 1900. The organo-silicon halides thus formed are then hydrolyzed to form silicols (the monol, diol, and triol are all being utilized) which produce the silicone polymers upon condensation. The magnesium used in the Grignard reaction returns to the magnesium chloride from which it was made, thus resulting in a net expenditure of electrical energy only, if the magnesium chloride is reused.

The General Electric Co. produces silicols by contacting metallic silicon and a hydrocarbon halide in the presence of metallic copper at about 300° C., the silicols being formed by hydrolysis of the

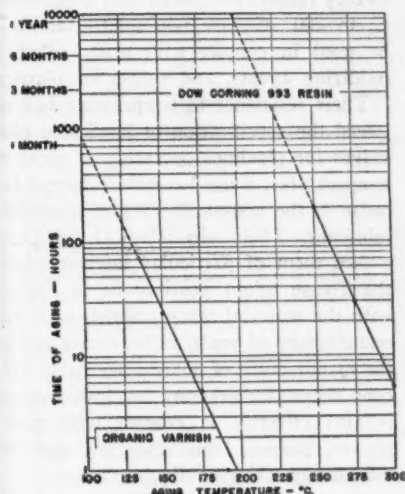
organo-silicon halide.<sup>2</sup> It is not the purpose of this article to discuss the merits of the two processes, although advantages are possessed by each. For example, much wider variance in the hydrocarbon substituent groups and control in the degree of substitution can be obtained by use of the Grignard reaction. However, it would seem that the direct process should be more economic for those organo-silicon compounds which can be produced by that process.

The first major contribution to the study of organic silicon compounds was by Prof. F. S. Kipping, of Nottingham, England, in 1899. Prof. Kipping was interested primarily in the production of silicone analogs to the various carbon compounds<sup>1</sup> and his 37 years of research have served as the basis for the present silicone development.

At about the time Professor Kipping concluded his work, the laboratories of the Corning Glass Works were studying the effect that would be produced on the polymeric form of silicon dioxide (sand) by modifying it with the substitution of organic groups. This problem was handed Dr. J. F. Hyde when he began work with the Corning Glass Works in the early thirties, and discovery of the first flexible silicone polymer with the heat resistance required for use with fibrous glass resulted in the expansion of this work and the establishment of another group of research workers under Dr. R. R. McGregor at the Mellon Institute of Industrial Research. The new group gave its principal attention to the liquid silicone derivatives. These researches eventually led to the formation of Dow Corning Corp., which has constructed a plant in Midland, Michigan, to produce and further develop silicone products for use by American industry.

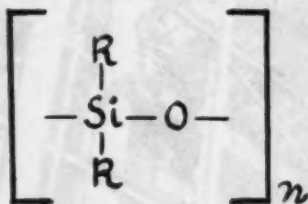
### STRUCTURE

At the present time, silicones must be classified as costly specialty materials



The greater temperature resistance of a silicone finish, when compared to an organic varnish is graphically illustrated by the above chart.

(\$3-7 per pound) but lower prices can be expected as production rate steps up. They represent an entirely new and increasingly useful class of compounds. In their simplest form they consist of a polysiloxane of the general formula

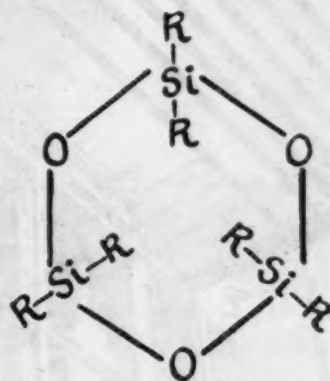


when produced in the linear form. In practice, however, such a linear structure is extremely difficult to achieve because of the presence of silanetriols,  $RSi(OH)_3$ , which tend to produce cross-linked polymers and polymers consisting of chains or rings. Cross-linking is also possible between the chains of rings.

The polymers that are produced have no such regular structure as that indicated by the above-noted formula since a more or less random distribution is achieved—the degree of ring formation and size of the rings being somewhat dependent upon the triol concentration, the size of the hydrocarbon substituent groups and the conditions under which the condensation reaction proceeds.

A silane diol, the monomer producing the linear polymer noted above, is also capable of forming individual ring com-

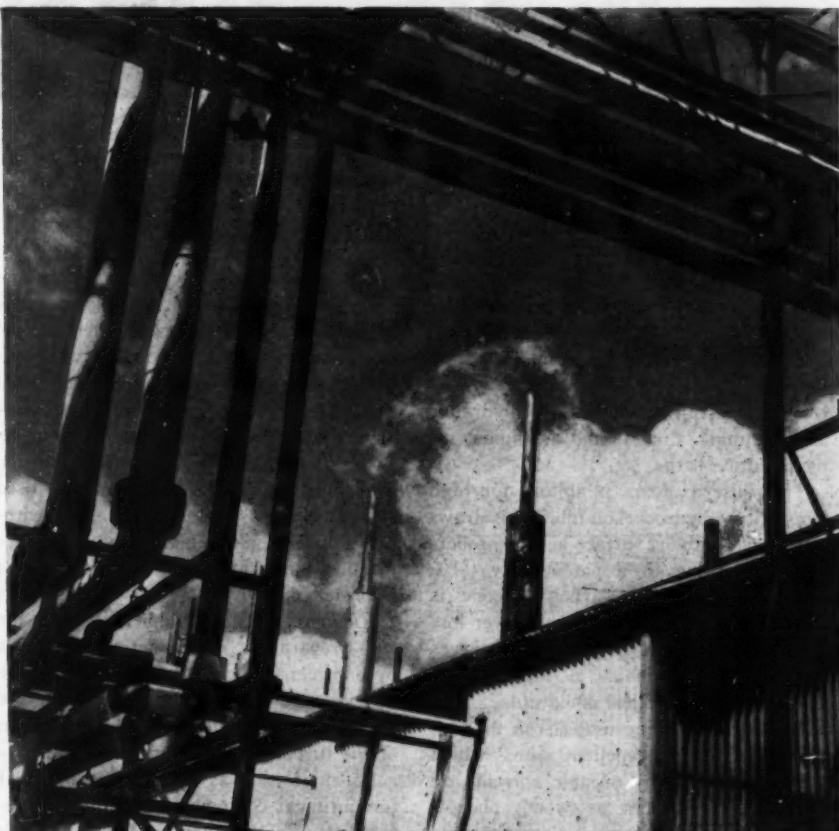
pounds with a structure somewhat as follows:



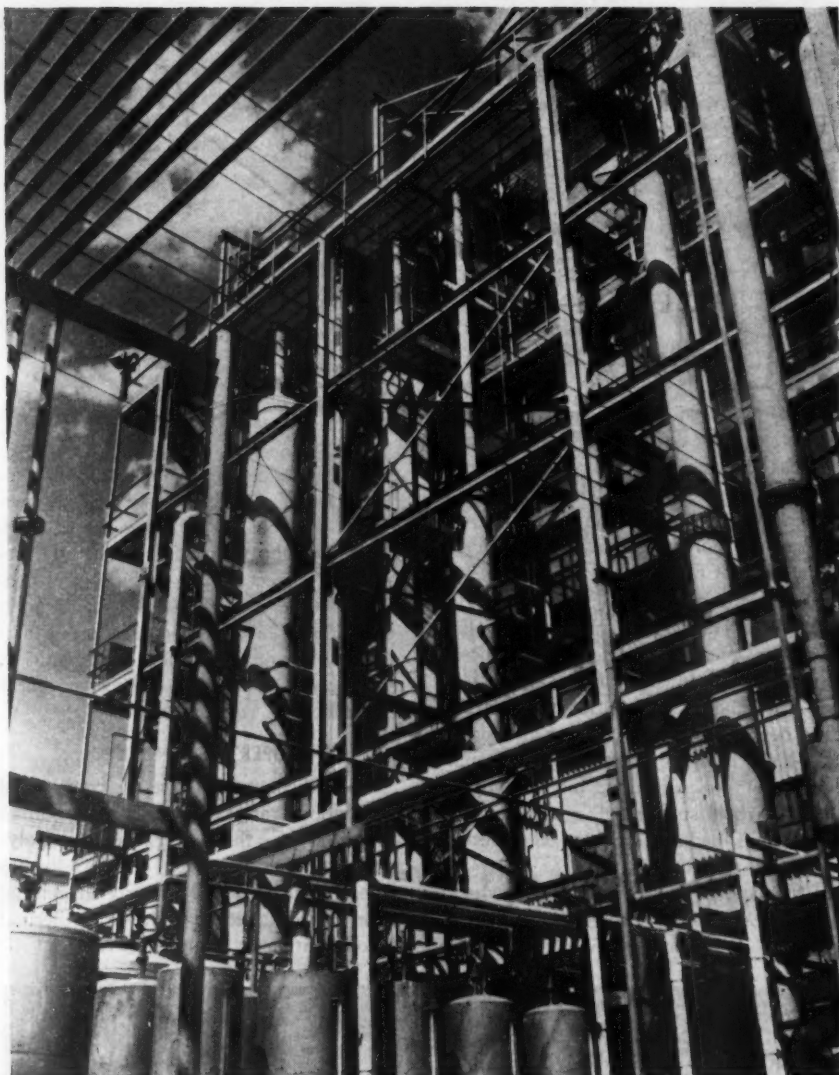
The presence of triol may also produce a cross-linking between the polymer chains or chains of rings. Although the statement which follows is not absolutely correct for all conditions, in general it may be said, as for organic polymers, that a medium degree of cross-linking will produce a rubber-like material; an increase in cross-linking produces thermosetting resinous bodies.

### PROPERTIES AND USES

The silicones that are in commercial production range from liquids boiling over 300° C. through rubber-like polymers to thermosetting resinous bodies whose principal uses at present depend upon their excellent resistance to thermal decomposition at high temperatures.



The exhaust mufflers shown above were both painted with an aluminum pigmented paint on the same day, a silicone resin providing the coating for the muffler on the left while the conventional aluminum paint was used on the badly rusted muffler to the right. Both mufflers have been exposed for over a year to surface temperatures of 430°-510° F.



Organo-silicon chlorides, the building blocks from which the silicones are produced, are separated by means of the distillation equipment shown above which is a part of the plant of the Dow-Corning Corp.

**Liquids.** The non-volatility of the liquids and their stability at high temperatures (up to 250° C.) indicate an important field of usage as a heat transfer media. In addition, these materials have extremely low freezing points and are stable to contact with both air and moisture, suggesting their use as hydraulic and damping fluids, and as fluids for temperature baths.

Their use as foam inhibitors for high temperature hydrocarbon lubricants draws attention to their surface-active properties. According to a patent only 0.1% of polymerized hydrocarbon silicone is employed. Their low electrical power loss over a wide range of frequencies serves to make them valuable as liquid filling materials for electrical apparatus.

Another interesting usage is in the formation of water repellent films which are not removed by organic solvents on such varied surfaces as wood, phenol-formaldehyde plastics and glass or other ceramic surfaces. Other uses of interest to the chemical industry include impregnants for pump packings, gaskets, damping fluids for precision instruments and

general lubricating oils for high temperature applications.

Their incompatibility with organic materials makes them particularly valuable as surface release agents in injection and compression molding. Their low viscosity-temperature coefficient, low freezing point (down to -72° C.) and low vapor pressure make them particularly useful as hydraulic fluids or thermal expansion fluids. Usually these liquids can be used in contact with rubber and plastics without difficulty although when used with plastics, migration of the plasticizers has been noted.

**Rubbers.** Silicone rubber is used for the preparation of gasketing materials by impregnation of glass fabric. These provide the necessary resistance to the temperatures produced in the operation of the turbo-supercharger. This use suggests application as a gasketing material for chemical equipment operating at elevated temperatures (up to 250° C.). Such uses are limited at present by the moderate resistance of silicone rubbers to chemical attack and their relatively low tensile strength.

Another use is as the insulating and coating sheath for wires and cables where the excellent dielectric properties and resistance to ozone, corona discharge and ultra violet light, combined with good adherence to metals and high temperature resistance, provide a high use incentive.

**Resins.** An increase in the degree of web polymer formation (cross-linking) produces a thermosetting resinous material instead of the fluids or rubbers that have already been described. These resins are of interest to the chemical industry as heat and water resistant coatings. Among the suggested uses are the coating of hot metal surfaces subject to atmospheric corrosion, such as steam pipes and exhaust stacks. Other uses include the preparation of adhesives and molding and laminating materials.

Although of great interest for their potential direct application by the chemical industry, the silicones promise to be of the greatest immediate importance in an indirect manner, namely, the manufacture of greatly improved electric motors.<sup>3</sup> These motors possess greatly increased moisture and temperature resistance, the latter allowing a reduction in the size of motor required for a given operation because of higher permissible operating temperatures. Use of smaller motors for applications where a large overload exists for a short time is also permitted, as in the operation of centrifuges where a large overload occurs during the period of acceleration.

In general, where their valuable properties counterbalance their increased cost, it may be said that the silicones warrant consideration for nearly any application for which organic plastics are suited.

**Compounded Products (Greases).** There are many places in the chemical industry where the low heat resistance of organic lubricants causes great difficulty. Silicone greases, silicone liquids thickened with carbon black or metallic soaps, have solved many of these problems as they retain their consistency from -40° C. to 200° C., are non-volatile and can be used in contact with acids, alkalis, oxidizing agents, and rubber or plastics.

Their resistance to temperature has allowed the specification of lubricated plug valves for pipelines operating at elevated temperatures, a use heretofore barred because of the non-availability of a suitable lubricant. Their physiological inactivity makes them of particular interest where the grease might possibly be in contact with the material being treated, as in the manufacture of yeast, in breweries and in the manufacture of pharmaceuticals. Silicone grease for pressure lubricated valves is also effective in contact with phosphorus, phenol, liquid chlorine, and hot magnesium chloride liquor.

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2. Journ. Am. Chem. Soc. 67, 963 (1935).
3. Westinghouse Eng. Sept. 1944, 138 and Sept. 1945, 135.

# Production and Earnings In Chemical Industry

THE DATA PRESENTED IN THE FOLLOWING table and graphs were compiled from official sources by the Manufacturing Chemists' Association. The tremendous production rise during the war and the consistently high earnings in the chemical industry compared with those in manufacturing industries as a whole are clearly brought out by these figures.

STATISTICS are valuable only insofar as the data are comparable and clearly defined. The term "chemical industry" covers such a multitude of activities that the following statistics have meaning only when their scope is unambiguously set forth.

With the exception of the Federal Reserve production graph, the term "chemicals" refers to the data listed by the Department of Labor under its "chemicals" classification, and does not include soap, explosives, petroleum refining, rayon, drugs, fertilizers, cottonseed products or paints and varnishes.

In the Federal Reserve graph the data compiled under the term "chemical production" refers to the "industrial chemicals" subclassification, based upon the "chemicals n. e. c." group of the 1939

Census of Manufactures, plastic materials, crude and intermediate coal tar products, and compressed and liquefied gases.

The Index of Real Weekly Earnings, heretofore a part of the MCA report, was omitted. This index, based on the 1923-25 period, depicted the chemical industry in a favorable "take home" earnings position as compared with "all manufacturing" industries. This favorable position is reversed when the index is computed from BLS employment and pay-

roll indexes based upon the year 1939=100. Reasons for this lie in inconsistencies and shortcomings in those series, coupled with the Bureau's selection of 1939 as the basis for calculation. Selection of 1939 as the base year failed to take into account the higher rate of activity of the chemical industry compared with that of others (aircraft and shipbuilding, for example) which skyrocketed during the war. Figured on the old 1923-25 base, the index of chemical employment during 1939 was 26.8 per cent higher and the payrolls 54 per cent higher than for all manufacturing. Choice of the 1939 base as 100 for both series therefore nullified the favorable standing of chemicals previously portrayed in BLS index series.

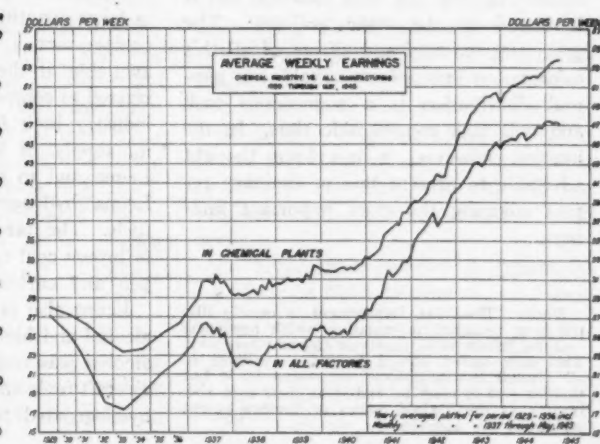
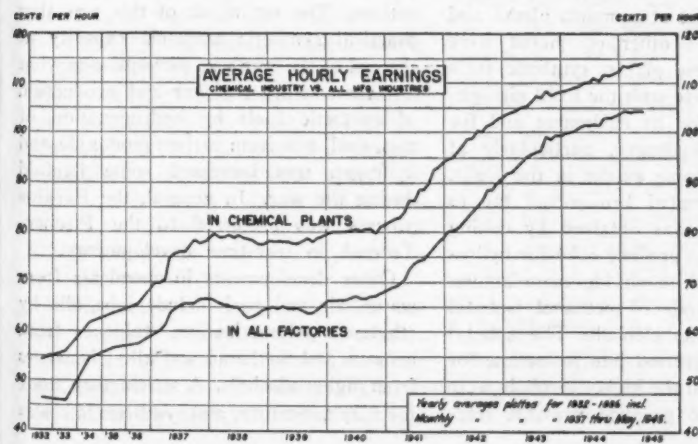
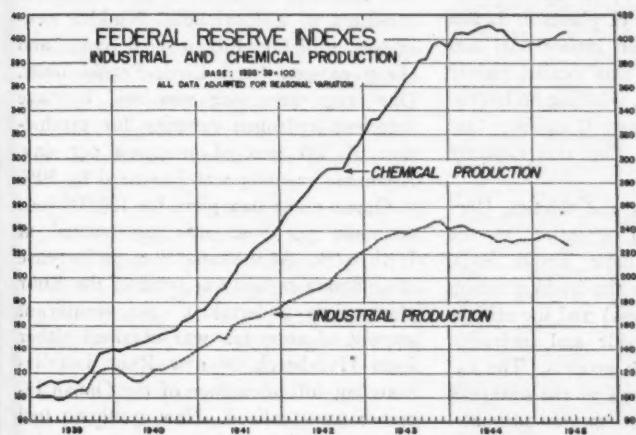
Actually, dollar earnings per week in the chemical industry are far ahead of all manufacturing, as shown in the graph. The real earnings index has therefore been withheld in order to avoid possible misinterpretation.

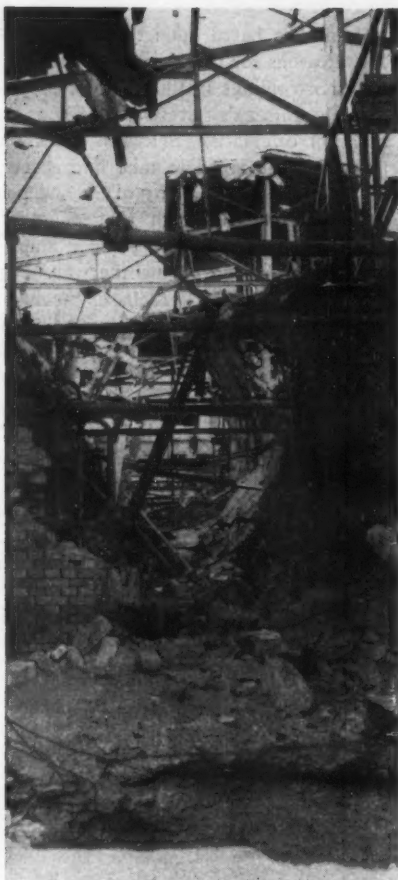
## ANNUAL EARNINGS AND EMPLOYMENT SUMMARY

Chemicals, Allied Products and All Manufacturing

	1944	1943	1939
<b>Average Weekly Earnings</b>			
All Manufacturing Industries	\$46.08	\$43.14	\$23.86
Chemicals, n.e.c.	51.65	48.75	31.30
Drugs, Medicines & Insecticides	34.80	33.50	24.16
Paints, Varnishes & Colors	45.76	42.31	28.48
Explosives	47.02	47.29	29.99
Fertilizers	30.01	26.69	14.71
<b>Average Hourly Earnings</b>			
All Manufacturing Industries	\$1.019	\$0.961	\$0.633
Chemicals, n.e.c.	1.105	1.064	.784
Drugs, Medicines & Insecticides	.809	.768	.592
Paints, Varnishes & Colors	.967	.926	.704
Explosives	1.021	1.015	.773
Fertilizers	.676	.617	.412
<b>Average Weekly Hours</b>			
All Manufacturing Industries	45.2	44.9	37.7
Chemicals, n.e.c.	45.7	45.3	39.5
Drugs, Medicines & Insecticides	43.2	43.6	39.7
Paints, Varnishes & Colors	47.4	45.8	40.5
Explosives	46.0	46.6	38.8
Fertilizers	44.4	43.3	35.8
<b>Indexes of Wage Earner Employment<sup>1</sup></b>			
All Manufacturing Industries	166.7	175.7	100.0
Chemicals, n.e.c.	170.6	167.7	100.0
Drugs, Medicines & Insecticides	184.0	166.1	100.0
Compressed gases	151.7	160.2	100.0
Explosives	1091.4	1248.4	100.0
Fertilizers	116.9	120.9	100.0
<b>Indexes of Wage Earner Payrolls<sup>1</sup></b>			
All Manufacturing Industries	334.2	330.4	100.0
Chemicals, n.e.c.	294.2	273.5	100.0
Drugs, Medicines & Insecticides	269.2	233.4	100.0
Compressed gases	266.9	264.3	100.0
Explosives	1673.8	1918.5	100.0
Fertilizers	250.2	225.0	100.0
<b>Estimated Number of Wage Earners<sup>2</sup></b>			
All Manufacturing Industries	13,653	14,394	8,192
Chemicals, n.e.c.	118.7	116.7	69.6
Drugs, Medicines & Insecticides	50.4	45.5	27.4
Compressed gases	6.0	6.3	4.0
Explosives	79.2	90.5	7.3
Fertilizers	21.9	22.7	18.8

<sup>1</sup> Base: 1939 = 100.  
<sup>2</sup> In thousands.





Wreckage of an I.G. synthetic oil plant at Ludwigshafen, Germany.  
Army Signal Corps Photo

## Developments In The German Chemical Industry

Data Collected By Industrial Intelligence Staff,  
Chemical Warfare Service

**P**RIOR to the landing in Normandy, the Chief of Chemical Warfare Service had organized a group of investigators, military and civilian, to examine chemical industrial developments along chemical warfare lines. While the prime interest was in investigation of finished military products the examination also covered new developments in the production of the component items, particularly any new developments which would accelerate production in this country for the remainder of the war. These teams of investigators were expanded prior to VE-Day by inclusion of technicians particularly well acquainted with the prewar German chemical industry. Following VE-Day these teams, operating under the direction of SHAEF, proceeded to collect first-hand information regarding German chemical war activities. Although this work is still in progress, a tremendous amount of data has been collected and it is hoped can be made available. The gathering together and sifting of all this information into a form suitable for general distribution is a tremendous task and will take considerable time. In the interim, however, it has been thought advisable to present this preliminary report covering the more important findings.

*Notice:* The War Department is merely distributing technical information which has come into its hands from captured German territory. This information should be made available to all United States citizens interested in it but their use of it must be and is at their own risk insofar as the United States or foreign patent violations are concerned.

### CHEMICALS FROM WATER, AIR AND COAL THROUGH HYDROGEN

By the late twenties, Germany had built up a fixed nitrogen capacity in the neighborhood of 1,000,000 tons of nitrogen annually. About 75% of this capacity was centered at the I. G. plants at Leuna and Oppau working on brown coal and coke. The other 25% was located mainly in several Ruhr plants, working on hydrogen from coke oven gas. It appears that the Germans believed that this capacity was adequate.

During the twenties and thirties, Germany paid increasing attention to the development of synthetic liquid fuels. This work resulted in the hydrogenation of coal (Bergius Process) and the utilization of carbon monoxide and hydrogen in the Fischer-Tropsch process. The capacity for synthetic fuels at the outbreak of the war was by no means adequate.

Since hydrogen was already produced in large quantities at ammonia plants, and compressors and other equipment were available at these plants, synthetic fuels started to compete with the fixed nitrogen industry both for its equipment and for its supply of hydrogen, particularly at Leuna and to some extent in the Ruhr. Leuna hydrogenated brown-coal tar to fuels. The tar was obtained by coking of brown coal to produce coke for hydrogen and carbon monoxide manufacture.

Leuna also produced methanol, isobutyl alcohol and higher alcohols. The isobutyl alcohol was converted into iso-octane for aircraft fuels and the higher alcohols were hydrogenated to produce valuable frac-

tion for other fuels. Total capacity for liquid fuels at Leuna was said to be 600,000 tons per year. As a result, not enough hydrogen was available at Leuna so increased gas manufacturing equipment was installed. A part of this equipment consisted of a continuous Winkler generator, utilizing brown coal coke and cheap oxygen from Linde-Frankl units. One large generator was said to have sufficient hydrogen capacity for production of 300 tons of ammonia per day. Ammonia capacity was increased by 50% at Oppau and a new plant for 100,000 tons ammonia per year was constructed at Hydebreck. At the same time, an increase of ammonia capacity at some of the Ruhr plants was undertaken. No significant amount of ammonia was obtained either from Hydebreck or new Ruhr installations but full advantage of the Oppau increase was realized. New synthetic fuel plants were installed at a number of locations. The net result of this was that practical synthetic ammonia capacity at the end of the war was perhaps somewhat less than before the war and production of synthetic fuels by hydrogenation of tars, coal, and from carbon monoxide and hydrogen was increased some fivefold during the war. In general, the Bergius process was preferred to the Fischer-Tropsch in war-time developments.

Other developments in chemicals from water, air and coal include lube oils by ethylene polymerization, toluene from benzene and methanol and alkyl benzenes from higher alcohols. A satisfactory stock for soap substitutes and synthetic fats was

## A FEW DEVELOPMENTS OF GERMAN CHEMICAL INDUSTRY

1. The work of the I. G. Farbenindustrie with acetylene under pressure has raised "the vinylation reaction to a status comparable to sulfonation or nitration."

2. Nickel carbonyl can be used as a catalyst for the formation of acrylic acid from acetylene, CO, and water. Substitution of ethanol for water gives ethyl acrylate. Using the same catalyst, tetrahydrofuran and CO give adipic acid.

3. The polyurethane formed from hexamethylene di-isocyanate and butanediol 1,4 are "... considered equal to nylon in most respects and superior in water absorption and dyeing characteristics."

4. Concentrated hydrogen peroxide (80-85%) was produced on a large scale for the first time by vacuum distillation.

5. 14 tons per day of dry yeast was produced from the waste liquor of a beechwood pulp plant. This yeast, containing 40-50% protein, was used as a foodstuff, chiefly for the army.

6. 500 tons per month of lubricating oil was synthesized by polymerizing ethylene in the presence of aluminum chloride.

7. Thiodiglycol was produced on a large scale from ethylene oxide and hydrogen sulfide for mustard gas preparation.

produced as a by-product. The Germans appear to have made little or no advance in ammonia synthesis technology except in hydrogen manufacture as noted above.

### ACETYLENE PRODUCTION AND UTILIZATION

Because of the lack of short chain hydrocarbons, acetylene occupied a position of abnormal importance in German chemical industry and research. A large number of products and processes were developed to relieve shortages or for lack of an alternative. Acetylene was definitely one of the most important raw materials of the German war economy.

While most acetylene was still made by the calcium carbide route, one large plant, at Hüls, was in successful operation using the arc process. The raw material was waste gas from coal hydrogenation, natural gas, or coke oven gas residues after passing through the Linde process. Its success was largely due to the discovery that acetylene can be safely handled under pressure by observing certain precautions, and that water can be used as the recovery solvent by taking advantage of the fact that the pressure solubility characteristics of acetylene are almost identical with those of carbon dioxide. A power consumption of 4.3-4.8 KWH per pound of pure acetylene was attained at this plant.

While many of the reactions employed had been disclosed in patents and other literature, the extent to which their use had developed is of distinct interest. Butadiene, for example, was made from

acetylene, either via the acetaldehyde-aldol route, or via the formaldehyde-acetylene (butenediol) route to conserve acetylene. Even ethylene and ethyl alcohol were made from acetylene, and synthetic lubricating oil was produced by polymerizing the ethylene.

By working out safe conditions for handling acetylene under pressure, the I. G. Farbenindustrie freed the chemistry of acetylene from the limitations imposed by the hazards involved and was able to raise the vinylation reaction to a status comparable to sulfonation or nitration, working without accidents at pressures up to 20 atmospheres and temperatures up to 2000° C. The alkali alcoholate catalysts disclosed in I. G. patents were used to make vinyl ethers of the alcohols containing up to eighteen carbon atoms, the products being then converted into polymers for use in various fields, including textile assistants and sizes, adhesives, wood and fibre impregnants, pour point depressants, and plasticizers. This type of catalyst also served to produce vinyl amines, such as vinyl carbazole, and could, in general, be used for the vinylation of any organic compound containing active hydrogen. For making ring substituted phenols, the catalyst used was a zinc (or cadmium) salt of an organic acid. Vinyl isobutyl phenol (Koresin) was produced by this procedure.

A third catalyst of major importance was copper (or silver) acetylide. By proper preparation on a support and by proper control of operating conditions,

this temperamental compound was brought under control. Using this catalyst, the triple bond of acetylene is retained and addition takes place at one or both carbon atoms. With alkylolamines, propargylamines were obtained; with vinylamines, aminobutines (which can readily be rearranged to butadienes), and with aldehydes or ketones, acetylenic alcohols or glycols were formed. Butenediol, from acetylene and formaldehyde, was converted to tetrahydrofuran and thence to butadiene, thus substituting methanol for part of the acetylene.

A fourth catalyst recently found was nickel carbonyl, which could be used to introduce the CO group into the molecule. Thus, acrylic acid could be produced from acetylene, water and CO, or, starting with alcohol instead of water, ethyl acrylate was manufactured. Using the same catalyst, CO was added to tetrahydrofuran to give adipic acid.

By using a modification of the copper acetylide catalyst (addition of alkali chloride) in aqueous hydrochloric acid solution, acrylonitrile was produced on a large scale by the direct addition of hydrocyanic acid to acetylene. In the presence of mercuric chloride, vinyl chloride was produced and with zinc acetate, vinyl acetate.

Other important compounds from acetylene include the following:

Glycerine	Pyrrole
Tetrahydrofuran	Glutaric Acid
Adipic Acid	3-Cyanobutyric Acid
5-Amino Caproic Acid	Glutaronitrile
3-Butyrolactone and Lactam	Pentamethylenediamine
Alpha-Pyrrolidone	Dihydrofuran

N-Vinyl pyrrolidone  
(Periston)  
Acrylic Acid  
Aralkyldicarboxylic  
Acids  
Propionaldehyde  
Erythritol  
Maleic Acid  
Succinic Acid  
Mellitic Acid  
Pyromellitic Acid  
Ketopimelic Acid

Piperidine  
Vinyl Acetylene  
Methyl Vinyl Ketone  
Acetonyl Acetone  
Butanetriol-1,3,4  
Allyl Alcohol  
Adiponitrile  
Hexamethylene  
Diamine  
Pyrrolidine

#### SURFACE ACTIVE CHEMICALS

One of the most important discoveries made was the fact that the addition of cellulose glycolic acid sodium salt to synthetic detergents increases their effectiveness to fully the equivalent of that of soap. The amount required was about 25% of the amount of synthetic detergent.

The production of synthetic detergents was greatly expanded, reaching 75,000,000 pounds per year. Besides the I. G. types, the Igepons and Igepals, the two synthetic American types, alkyl benzene sulfonates and aliphatic sulfonates, were produced in large quantities. The fatty acid and consequent soap shortage was largely relieved by substituting the synthetics or incorporating them in the soaps made of necessity from synthetic fatty acids.

The older emulsifying agents were of linear polymers, such as Igamid<sup>®</sup>, pro-Later there was introduced the Emulphor STH and STX type, made by condensing a long chain aliphatic sulfone chloride (Mersol) with ammonia and then with chloroacetic acid. This was favored for drawing oil emulsions as it conferred extreme pressure lubricant properties and gave very smooth surfaces with anti-rust characteristics. Later, because of shortages, dodecyl xylene sulfonate was also sold under the same name.

Demulsifying agents were of three types—alkyl aryl polyglycol ethers, derivatives (amides) of hydroxyoleic acid sulfate ester, and the sulfonate of di (ethyl hexyl) maleate. These were each very specific for certain types of petroleum.

Water resistance of cellulosic fibers was attained by treating with hexamethylene di-isocyanate or by using an emulsion of paraffin wax containing zirconium oxychloride (Persistol, said to be resistant to washing) or aluminum acetate (not fast to washing). A claim was made that treatment with di (hydroxymethyl) phenols produced permanent water repellance.

Textile-finishing materials, wetting agents, dyeing assistants, lubricants, printing assistants, levelling agents, etc., were marketed in large numbers. Most of these were based on combinations of the Igepon-Igepal-Alipals or a composition containing selected vinyl ethers. By suitable combinations of these ingredients and natural or synthetic oils most of the various members of the wide range of textile assistants were produced.

#### TANNING AGENTS

An interesting group of synthetic tanning agents known as Tanigans had been developed by the Germans. Tanigan A was produced by condensing together

4,4'-dioxydiphenyl sulfone, the alkaline waste liquors from cellulose treating plants and formaldehyde. A complicated resin resulted which in solution formed a good tanning bath.

Tanigan Extra B was produced by condensing phenol with formaldehyde in the presence of sulfuric acid to form 4,4'-dihydroxy diphenyl methane. This was partially sulfonated and the sulfonated material condensed with further quantities of formaldehyde to form 2,2'-dihydroxy-5-(p-hydroxybenzyl)5'-(p-hydroxy-m-sulfo-benzyl) diphenylmethane.

Tanigan Extra E was a mixture of Tanigan Extra B and the product formed by condensing 4,4'-dihydroxy diphenyl methane with the alkaline waste liquors from cellulose treating.

#### POLYMERS

**Plastics.** Nearly all of the new developments in plastics involved polymers which were at least known before the war. An example of a new field of polymers was the polyvinyl pyrrolidones made from gamma butyrolactone, ammonia and acetylene. This field was still very much in the embryonic stage. The uses of these polymers, which in some ways physically resemble albumen, may not parallel those of the older plastics as is evident from their employment in the blood substitute, Periston.

A class known before the war which has undergone great development is that of the polyurethanes produced by the reaction of di-isocyanates with polyalcohols. Linear polymers, such as Igamid, produced from 1,6-hexamethylene di-isocyanate and 1,4-butanediol, can be injection and compression molded. The products have good mechanical strength and electrical properties and very low water absorption. Fibers and bristles can be made by hot melt spinning and stretching, and leather substitutes, by sheeting. Other linear polymers furnish plywood adhesives more elastic than phenolics. When alcohols with more than two functional groups were used, infusible polymers were produced which make coatings of great weather resistance and very impervious to gases.

As might be expected from the fact that acetylene had become the building block for so much of the German aliphatic chemical industry, the vinyl plastics were greatly expanded. Polyvinyl acetate and the polyacrylates were running a race, with cheapness favoring the former and quality the latter. A new and cheap process of producing acrylic acid in one step from acetylene promised to intensify the competition. In general, all methods of polymerization, mass, solvent, emulsion and suspension, were in use and not only were many different types of products made depending on conditions of polymerization, but the possibilities of copolymers were fully utilized. The vinyl polymers were used for surface coatings, glues, paints, food preserving, safety

glass, cloth impregnation, artificial leather and extended tubing. The vinyl acetals had not been developed as much as in the United States due to the smaller market for safety glass.

Unplasticized polyvinyl chloride stabilized with phenylindol had a large use for molding, sheets, tubes and stretched films. Much of the first three forms was used for chemical equipment and the films were employed for packaging and insulation. Development was under way for continuous calendering machines. The plasticized product was used for wire insulation, fabric coating, shoe soles, rain coats, shower curtains and fibers.

After-chlorinated polyvinyl chloride does not seem to have made much headway, but copolymers of vinyl chloride and methyl acrylate and particularly of diethyl maleate were growing in importance. Vinyl carbazole and vinyl benzoate were new compounds but both proved of little commercial interest. The great demand for styrene for synthetic rubber slowed its development as a plastic.

There was little new in the phenolic and urea classes of thermosetting resins. In the melamine field, a new type was produced by reacting benzonitrile with dicyandiamide and condensing the resultant product with formaldehyde. Such resins give lacquers with good gloss and better heat stability than ordinary melamines.

**Elastomers.** In the field of elastomers Germany has shown little development over American practice and only three products are worthy of mention, namely, Buna, polyethylene and polyisobutylene.

Buna (or synthetic rubber) was produced in a number of grades known as S, SS, and SR. Production in general followed conventional lines involving the copolymerization of butadiene and styrene in aqueous emulsion. There are certain modifications however. The lack of fatty acids resulted in the extensive use of a synthetic emulsifying agent (Nekal), only 10% of the required emulsifier being used in the form of an alkaline salt of a fatty acid. Potassium persulfate was used as activator and di-isopropyl xanthogenate as a chain modifier. Polymerization was controlled by using phenyl beta naphthylamine and was carried out in a series of six reactors in cascade fashion. After recovery of unreacted monomers coagulation was conducted in two stages using, firstly, a mixture of calcium and sodium chlorides and, secondly, acetic acid. The coagulum passes to a fourdrinier-type paper machine where it is drained, then squeezed between rolls, dried in a four-compartment drier, and reaches the market in 50-kg. rolls. In spite of the clean appearance, German Buna S seems to have proved inferior to that produced in the United States and lacked uniformity of quality.

An interesting tackifier was developed to aid the adhesion of Buna, known as

Koresin. This proved to be a condensation product of p-isobutyl phenol and acetylene.

Butadiene was produced by a cumbersome synthesis from acetylene through the following steps:

- Calcium Carbide  $\rightarrow$  Acetylene (1)
- Acetylene + Formaldehyde  $\rightarrow$  Butenediol (2)
- Butenediol  $\rightarrow$  Butanediol (3)
- Butenediol  $\rightarrow$  Tetrahydrofuran (4)
- Tetrahydrofuran  $\rightarrow$  Butadiene (5)

Tetrahydrofuran is an intermediate produced in the dehydration of butanediol which was not always separated, steps (4) and (5) being combined. The alternative procedure was to pass from acetylene to acetaldehyde and then to aldol, butylene glycol and butadiene.

Styrene was made in the conventional manner by the dehydrogenation of ethylbenzene which was synthesized from ethylene and benzene. Ethylene for this process was produced from ethyl alcohol or by the hydrogenation of acetylene.

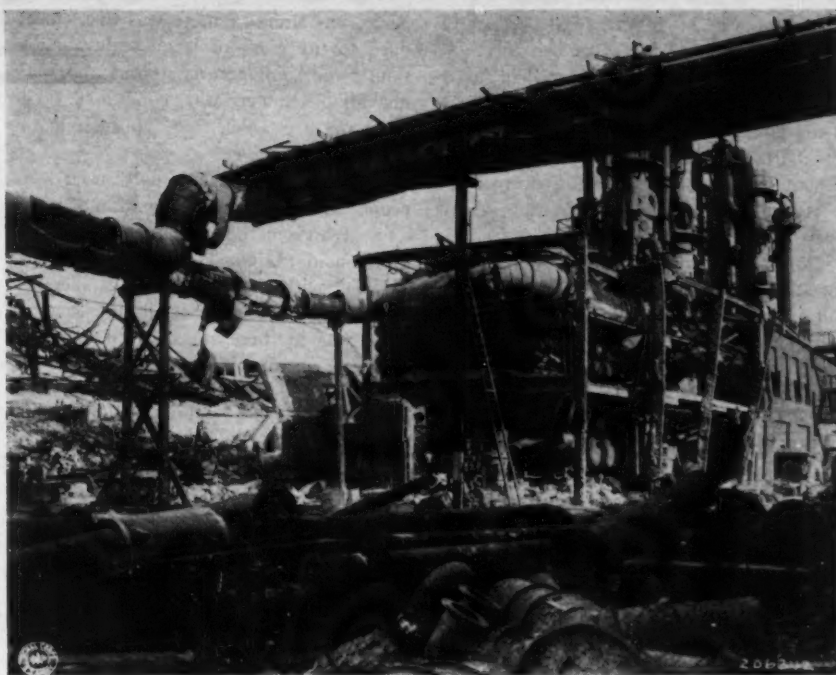
There seems to have been very little Perbunan produced in Germany and only relatively small amounts of Buna SS and SR. No evidence has been found of commercial production of Neoprene.

Polyethylene (Lupolen) was produced in two grades, one of molecular weight 3,000 with low viscosity and the other of molecular weight 15,000 and high viscosity. Ethylene was polymerized at 2,000 atmospheres with oxygen as a catalyst to give the high molecular weight material, and in alcoholic solution at 30 atmospheres with benzoyl peroxide catalyst to give the low molecular weight material. Polyethylene mixed with polyisobutylene (Oppanol) gave a product that could be milled and calendered readily.

Polyisobutylene (Oppanol) was made by mixing isobutylene with ethylene and polymerizing on a belt conveyor using 1%  $\text{BF}_3$  as a catalyst. The temperature was kept below  $-100^\circ \text{C}$ . by allowing the ethylene to evaporate. The conveyor was totally enclosed, the ethylene being re-used. Oppanol, added to the extent of approximately 0.5% was used to raise the viscosity of lubricating oils. Although Oppanol alone cannot be vulcanized, mixed with 1% butadiene, or with isobutylene, it can be vulcanized readily. In this form it found use as electrical cable insulation.

**Textile Fibers.** The chief development in this line during the war period was the introduction of the polyurethanes. The most important combination used was hexamethylene di-isocyanate with butanediol-1,4. The polyurethanes were considered equal to nylon in most respects and superior in water absorption and dyeing characteristics. The polyester type was also made, and the I. G. polyamide type from 5-aminocaproic acid (5-caprolactam).

Much work was done on improvements in making cellulose acetate and regenerated cellulose, particularly to reduce usage



Ruins of the main section of the synthetic rubber plant at Ludwigshafen.

Army Signal Corps Photo

of acetic acid by use of solvents, and to speed up the viscose cycle. The polyurethane intermediate, hexamethylene diisocyanate, and other diisocyanates were also used to produce a surface treated, water resistant viscose rayon. The cuprammonium process was also greatly improved in both ammonia and copper recovery, the latter being done cheaply and almost quantitatively. In cost this process was considered comparable with the viscose route.

Special acid and chemical resistant fibers were woven of polyvinyl chloride (chlorinated and unchlorinated) and of polyethylene fibers.

#### ELECTROCHEMICALS

The German position in the manufacture of aluminum was disadvantageous because bauxite had to be imported from France, Hungary, Greece and Croatia. An experimental plant was operated for production from clay using sulfuric acid, followed by alkali. The process could be used if no bauxite were available, but was not considered economical. In the conventional process, Soderberg electrodes were used to a considerable extent because of the lower cost due to baking in the cell. The largest cells used 32,000 amperes, voltages 4.5-5.0, the current efficiency 84-88% and the power consumption 7.7-8.8 KWH per pound of metal. Alloy ingots were cast continuously into chilled molds from 5" to 40" in diameter and in lengths up to six feet.

Germany's magnesium production capacity was increased to about 70,000,000 pounds per year in 1944 compared to an estimated capacity of 35,000,000 pounds in 1939. The main production increase was brought about by duplication of existing equipment, although the latest cells were fifty percent larger than the pre-

war cells. The cell designs and operating procedures followed published information. The current used was 18,000-32,000 amperes and the efficiency about 88%. The power required was 8.0-8.5 KWH per pound of metal for electrolysis and about 11.2 KWH overall.

The war expansion of the German caustic and chlorine industry was in mercury cells although existing Billeter cell installations were operated as required. The trend to mercury cells increased rapidly in 1937 at which time mercury was very cheap in Germany due to political connections with Spain. The Germans were well satisfied with the mercury cell, however, and it did eliminate expensive evaporation equipment. The largest cells under construction at the close of the war were 28,000 amperes which were believed to be the largest capacity chlorine cells in the world. The usual 16,000 ampere cells required 4.5-5.0 volts and had a current efficiency of 94-95%. A new and very interesting vertical rotating mercury cell was used in the most recent plant expansions. This cell required much less floor space than the conventional horizontal cells. A trend toward liquefaction of chlorine by means of higher compression followed by water cooling without artificial refrigeration was noted. A new type of rectifier, which was alleged to operate at high efficiency in the lower voltage range, was employed in at least two of the newer installations.

Alkali chlorates were made by the electrolysis of mixed KCl and NaCl in cells with fused magnetite or graphite anodes and iron plate cathodes. The voltage with magnetite anodes was 3.6 and with graphite 3.2, but the graphite consumption was high when used. The electrodes were spaced about 1" apart, the current was 10,000-14,000 amperes and the power con-

sumption was 2.8 KWH D.C. per pound of either chlorate.

Metallic calcium was produced in fused  $\text{CaCl}_2$  bath cells operating at 25 volts and 1,400 amperes, giving 13 kg. per cell per day. Production was 50 tons per month. About 1,500 pounds per month were converted to calcium hydride in tight electrically heated retorts.

Potassium permanganate was made by roasting manganese ore with potash in a rotating kiln at  $450^\circ\text{C}$ . with excess air. This was electrolysed in 12,000 ampere cells at 2.8 volts per cell with a current efficiency of 65%. The anodes were nickel plated steel and the cathodes steel.

Sodium was produced by the electrolysis of fused  $\text{NaCl}$  in the usual way until plants were closed by bombing; thereafter the obsolete Castner process using fused caustic soda was utilized.

Some hydrogen was made by the electrolysis of water to augment other supplies. The cells used  $\text{KOH}$  as electrolyte and operated at 12,000 amperes and 2.2-2.5 volts. 5-6 KWH were required per cubic meter of hydrogen.

Fluorine was produced by electrolysis in a cell made of metallic magnesium with carbon anodes and nickel cathodes. The electrolyte, which was  $\text{KF} \times (\text{HF})$ , was kept at  $100^\circ\text{C}$ . and heat was not dissipated since liquid  $\text{HF}$  was fed into the cell and broken down into  $\text{H}_2$  and  $\text{F}_2$ . The gases from the cell were passed through a coil immersed in dry ice ( $-80^\circ\text{C}$ .) to remove  $\text{HF}$ .

#### ROCKET PROPULSION CHEMICALS

A considerable number of chemical systems were studied for use in rocket propulsion. Selection of the chemicals was made largely on the ground of availability rather than desirability. Each system had two main constituents, an oxidizing agent and a fuel. The constituents reacted chemically in a combustion chamber at 30-40 atmospheres pressure and the products of combustion drove the rocket by passing out through a jet.

The principal oxidizing agents considered were 98-100% nitric acid which was found to be too corrosive, 98-100% nitric acid with 5-10% strong sulfuric acid added, liquid oxygen which was difficult to handle, 80-85% hydrogen peroxide with or without sodium or calcium permanganate, and ammonium nitrate.

The principal fuels considered were methanol, ethanol, hydrazine hydrate, hydrazine hydrate plus methanol, 57% m-xylidine plus 47% triethylamine, 8-hydroxyquinoline, furfuryl alcohol, vinyl ethyl ether, gasoline, diesel oil, "Optol" (a hydrogenated lignite tar fraction) and "Ergol" (a mixture of "Optol," tetrahydrofuran, furfuryl alcohol and aniline).

A few monofuel systems were also studied. These included 65-85% methyl nitrate in methanol, ammonium nitrate plus ammonia, ammonia and nitrous oxide, and tetranitromethane plus a solution of 8-hydroxyquinoline in 80-85% hydrogen

peroxide. None of these was ever developed to the point of large scale application, some being too dangerous and some unavailable under war conditions. The first mixture above was considered the most promising.

Most of the rockets actually used were propelled either by a combination of liquid oxygen and methanol or ethanol, or by mixed acid (5-10%  $\text{H}_2\text{SO}_4$  plus 95-100%  $\text{HNO}_3$ ) with an oxidizable substance. In the case of the V-2 rocket, the starting cycle was in three steps. First, permanganate reacted with hydrogen peroxide, giving superheated steam which drove a turbine connected to the pumps. The pumps delivered hydrogen peroxide and hydrazine hydrate in methanol solution to the combustion chamber, where an instantaneous, strongly exothermic reaction occurred. When the reaction chamber became hot enough, the permanganate and peroxide shut off automatically and the rocket drive was taken over by the liquid oxygen-alcohol combination. This system was also used, in principle, in experimental torpedoes and was engine tested for the trackless propulsion of submarine at high speed under water.

In connection with the rocket program, the most important of the chemicals produced on a large scale for the first time was concentrated hydrogen peroxide. The usual 30-35% commercial solutions made by the potassium persulfate, ammonium persulfate and persulfuric acid processes were brought up to 82-85% strength by vacuum concentration in two stages. In the first, the solution was vaporized continuously from a retort maintained at 73% concentration and the vapors, after passing through a separator, were fractionally condensed in a scrubbing tower as a 65% product. This 65% product was then fed into a second retort which was maintained at 80-85%. The vapors were again fractionally condensed and the condensate returned to the retort, from which the finished product overflowed. If an especially pure solution was required, the product was drawn off the bottom of the scrubber and the acidity adjusted with phosphoric acid. The product was of very high purity and stability. One plant had a capacity of 500 metric tons per month; a second plant had a capacity of 1,200 tons per month; and a third plant was under construction with a projected capacity of 2,100 tons.

Two non-electrolytic processes were being investigated because of the shortage of platinum and stainless steel. One was based on the passage of  $\text{H}_2$  plus  $\text{O}_2$  through a silent electrical discharge. The other was based on the reduction of 2-ethyl anthraquinone to 2-ethyl hydroanthraquinone by  $\text{H}_2$  followed by oxidation to 2-ethyl anthraquinone and  $\text{H}_2\text{O}_2$ . Pilot plants had been operated on both processes and a large plant for the 2-ethyl anthraquinone process was under construction in spite of explosion hazards encountered in the pilot plant.

#### OXIDATION PRODUCTS

Having produced mixtures of numerous hydrocarbons by the reduction (or hydrogenation) of coal in order to manufacture petroleum products, it was a logical step to consider the oxidation of these hydrocarbons to much needed oxygenated products. There is nothing essentially new in these ideas, but the urgency of war demands did much to stimulate work in this field. Production of fatty acids alone has been estimated at about 100,000 tons per year.

The procedure involved taking the mixed hydrocarbons and oxidizing by blowing with air according to standard methods. The resulting mixed fatty acids were then separated by fractionation.

The acids  $\text{C}_1$  to  $\text{C}_4$  were extracted with water while the higher members up to  $\text{C}_{24}$  were recovered in narrow boiling fractions consisting of a single product or a mixture of as many as six carboxylic acids.

It is of interest to note some of the uses to which these acids were put under war conditions in Germany.

- $\text{C}_1$  acid (Formic) for treatment of fodder silos.
- Acetic and butyric acids for esterification of cellulose.
- Propionic acid in the form of calcium salt as a bread preservative.
- $\text{C}_5$ - $\text{C}_9$  acids were reduced to alcohols and the latter condensed with phthalic anhydride to give glyptal type resins.
- $\text{C}_7$ - $\text{C}_9$  acids for fire extinguishers of the foamite type.
- $\text{C}_9$ - $\text{C}_{11}$  acids for mineral flotation.
- $\text{C}_{10}$ - $\text{C}_{18}$  acids were converted to soaps without further separation.
- $\text{C}_9$ - $\text{C}_{18}$  acids after removal of any dicarboxylic acids were converted to edible fats of good quality.
- $\text{C}_{18}$ - $\text{C}_{24}$  acids in the form of salts found uses in lubricating greases, as softening agents for leather, and lubricants for plastic moulding.
- The pitch residues after ketonization and further hydrogenation gave long chain hydrocarbons useful as vaseline substitutes.

Any of the above fractions by reduction can give higher alcohols and aldehydes useful in further synthesis, thus  $\text{C}_7$  and  $\text{C}_8$  alcohols were used for alkylation of benzene to form a gasoline additive.

A paraffin wax manufactured by hydrogenation of carbon monoxide was also used as a material for oxidation under pressure using a cobalt catalyst to give mixed fatty acids for soap manufacture.

#### CHLORINATION PRODUCTS

Methane was prepared from coke oven gas by liquefaction in Linde equipment and chlorinated in externally heated towers at  $370$ - $390^\circ\text{C}$ . with a five to one methane-chlorine ratio. Methyl chloride, methylene chloride, chloroform and higher chlorination products were condensed with refrigeration and the prod-

ucts separated by distillation. Carbon tetrachloride was made from  $CS_2$ .

Chlorine products containing 2 carbon atoms were made from acetylene, tetrachlorethane being the first product. Trichloroethylene was made by cracking HCl from tetrachlorethane. Pentachlorethane was made by the addition of chlorine to tri-. Perchlorethylene was made by splitting HCl from penta-, and hexa- was made by the addition of chlorine to per-. Dichlorethylene were made by the reduction of tetra- with iron. Vinyl chloride was made by the reaction of acetylene with anhydrous HCl.

The development of large scale processes for the manufacture of chlorine derivatives of ethylene by way of acetylene was one of the most outstanding achievements of the German chemical industry.

#### LUBRICANT AND FUEL ADDITIVES

Besides the usual tetraethyl lead in gasoline, little attention seemed to have been devoted to additives of this class. A polyisobutylene was used to improve the viscosity of oil. Polyvinyleyl ether and its copolymers with vinyl isobutyl ether were reported to be outstanding pour-point depressants for mineral oils. Two gasoline additives were claimed to prevent the corrosion of internal combustion engines when injecting water into the intake by depositing a rust inhibiting film on exposed parts. These were made from (a) dodecylphenyl chloride condensed with glycine cyclohexylamine salt) and (b) iso-butyl cyclohexyl butyric acid (cyclohexylamine salt).

Calcium benzoate (2%) was added to tropical greases to increase the melting point.

#### SUBSTITUTES

How far-reaching shortages of raw materials may be in a country at war is illustrated by Germany's efforts to find substitutes for soap, glycerol, emulsifiers and waxes.

The Gendorf plant of Anorgana A. G. produced detergents from acetylene by hydrogenation to ethylene, which was converted to ethylene oxide via chlorhydrin. Ethylene oxide was used for making glycols or was reacted with long chain alcohols to obtain detergents of the Leonil, Genapol or Igepon classes. The production of ethylene for these purposes amounted to 25,000-30,000 tons yearly.

At Hoechst, 1,530 tons of Glycerogen, a glycerol substitute, was produced in 1944 by two-stage hydrogenation of inverted hexose using a nickel catalyst at temperatures ranging from 80-200° C. and a pressure of 300 atmospheres. Glycerogen contains about 40% glycerol, 40% propylene glycol and 20% hexyl alcohols. Glycerogen can be used in place of glycerol for most purposes except for explosives.

Synthetic fatty acids were produced on a large scale in Germany at a number of

different points, the process consisting in the air oxidation of paraffins recovered from the hydrogenation of brown coal or lignite. Eighty thousand tons of fatty acids per year were produced in three plants and another plant was under construction. The  $C_9$  to  $C_{16}$  fraction of fatty acids was treated and converted into edible fats.

Dry yeast was produced at the Zellstoffabrik Waldof from waste liquor of a beechwood pulp plant at the rate of 14 tons a day from 200 tons of dry wood. This yeast, containing 40 to 50% protein, was used to produce soup powder and other protein-containing foodstuffs, chiefly for the army. The yeast was sold at one mark per kilo, half the price of lean meat.

Another source of food yeast was based on the growth of yeast on sugar produced from wood by the Bergius or other hydrolytic processes.

Because of the shortage of Rumanian oil, lubricating oil was synthesized in Germany by polymerizing ethylene with an aluminum chloride catalyst, producing a product with Engler viscosities of 3 and 6 at 100° C. The production accounted to 500 tons per month.

#### INSECTICIDES, INSECT REPELLANTS AND RODENTICIDES

DDT was widely manufactured in Germany and a number of variations were developed, such as difluoro diphenyl trichlorethane, known as Gix, and phenyl chlorophenyl trichlorethane. The former was more easily emulsified and was claimed to be more effective than DDT although much more expensive. No other variations of the DDT molecule appeared advantageous.

An entirely new approach was taken in the development of "Lausetto neu" which is  $\omega$ -chloromethyl 4-chlorophenyl

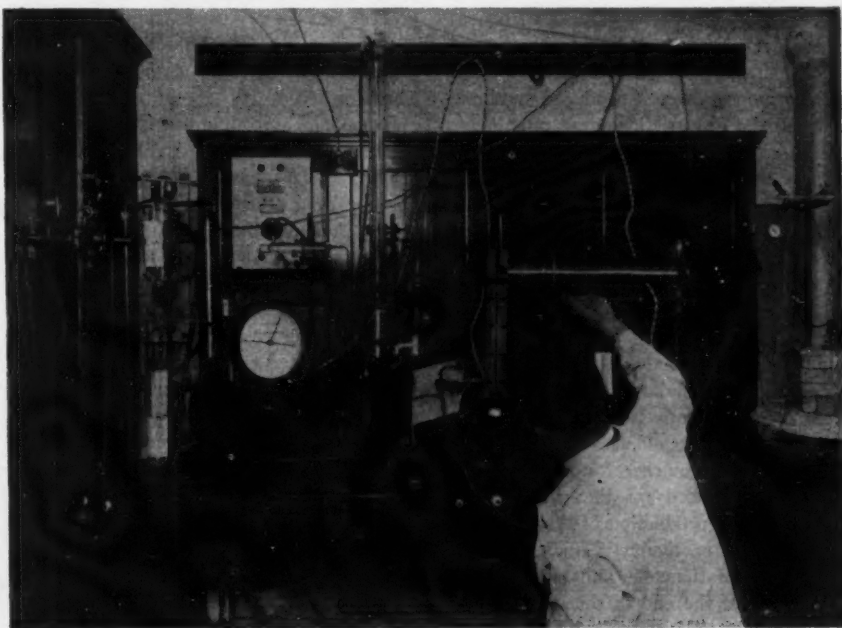
sulfone, said to be more active than DDT on the body louse and on bed bugs, but less so on flies. A mixture of the analogous  $\omega$ -chloromethyl phenyl sulfone and 3,4-dichlorobenzyl alcohol was even more active against bed bugs. Another new compound for uses similar to DDT is Lucex which is not as effective as DDT but is cheaper and is made by chlorinating the side chain of ethyl chlorobenzene.

For plant lice the hexaethyl ester of tetraphosphoric acid, Bladan, was more effective than nicotine even though unstable in aqueous solution. Nirosons, the active principle of which is tetranitrocarbazole, was used for control of insects and fungi on vines with and without addition of copper compounds. For similar purposes sprays based on 1-sulfocyno 2,4-dinitrobenzene were used. Pentachloronitrobenzene and 1,2,4-trichloro-3,5-dinitrobenzene were employed as soil disinfectants and the former was also used to disinfect wheat seed. Many variations of the ordinary copper and arsenic insecticides were in use.

While diethyl phthalate was largely used as a mosquito repellant, a very new compound, trichloroacetyl chlorethylamide was being tested. It appears to be effective against mosquitoes other than the anopheline (which is the malaria carrier) and superior to the phthalates.

The problem of replacing thallium in rodenticides became quite acute. Castrix was made from acetoacetic ester and urea followed by chlorination and amination. It is very toxic to mice but low in toxicity for domestic animals. A very new compound, para-dimethyl-aminophenyl diazo sodium sulfonate, was under development as another substitute for thallium in rodenticides.

Continued development of the Eulan moth repellants resulted in Eulan NK,



Watching flames in an electrical field at the Kaiser Wilhelm Institute for physical and electrochemistry, Berlin.

triphenyl 3,4-dichlorophenyl phosphonium chloride, particularly resistant in textiles to washing, and Eulan AL, 3,4-dichlorophenyl N-methyl sulfonamide which was produced in large quantities during the war.

#### PULP AND PAPER

Prehydrolysis of beechwood with 2.5% sulfuric acid and production of yeast from the hydrolysis liquors were combined with treatment of the wood residue by the kraft process to produce a pulp of 96% alpha content. Unbleached sulfite pulp of 88-90% alpha content was successfully used for the manufacture of nitrocellulose for explosives.

Where waste or cheap nitric acid was available, 98% alpha pulp was produced, especially suitable for acetate silk. Cellulose was being reduced with hydrogen at high pressure and 160° C. to produce a mixture of glycerine and glycols.

Binder twine of wet strength treated sulfate paper successfully replaced sisal.

A hybrid poplar was developed which analyzed up to 50% cellulose and can be grown in 8-10 years to 8" in diameter.

Products present in bisulfite waste liquors from the pulp industry were condensed with 4,4'-dioxo diphenyl sulfone and formaldehyde to form a useful tanning agent.

No evidence was found of the production of vanillin from waste liquors from pulp.

#### PHARMACEUTICALS

Due to Germany's large prewar capacity for producing pharmaceuticals, of which more than half was for export, she had little difficulty until near the end of the war in supplying the internal drug needs of the country.

I.G., Merck and Schering occupied a dominant role in this field. The I.G. particularly had entered almost all phases of the drug field, including synthetic and natural drugs, sera and vaccines, vitamins and hormones. Merck produced synthetic and natural drugs, including alkaloids; the latter class was also prominent in the lists of the two Boehringer firms and of Hofmann LaRoche. The plants of most of these firms were largely intact.

At Marburg, the I.G. Behringwerke operated Germany's largest serum and vaccine manufacturing establishment, using about 2,000 horses and 1,500 smaller animals. Their products were generally produced by standard and well-known methods, but many of their processes appeared to be less efficient than our own.

The main dependence for anti-bacterial agents was placed on the sulfa drugs, although their production of these did not appear to be particularly efficient. Supplies of sulfathiazole and sulfadiazine were short at the end of the war, as was the case with "Marfanil," a sulfonamide on which they relied largely for the treatment of anaerobic infections. Apparently

this compound was used so widely because the Germans had failed to develop a satisfactory production method for penicillin. Another new sulfonamide was Schering's "Globucid" (p-aminobenzenesulfonamide-ethyl-thiodiazole), which was produced in quantity largely because of its lower cost as compared to sulfadiazine.

It had been observed that certain halogenated derivatives of Salicil are effective antagonists to p-aminobenzoic acid. This led to their study as antibacterial agents, but their value was still in doubt when the war ended. The dibromo compound was coded No. 3065, and the tetrachloro compound, No. 3214.

One outstanding development was the use of a synthetic polymer, polyvinyl pyrrolidone in 2.5% solution for use as a blood substitute for the treatment of shock. Over 300,000 units had been used for military personnel, evidently without deleterious effects. The product was called "Periston."

Tropical diseases, especially malaria, received much attention at Elberfeld; this was particularly the case up to the time of the loss of North Africa. Atabrine continued to be produced in large quantities, and numerous other antimalarials were investigated, especially Sontochin, a quinoline derivative. Some of these showed some promise, but no new important ones which acted on other stages of the malaria parasite appeared to have been developed. Some new organic compounds of antimony were also made and had reached the clinical testing stage. For the treatment of venereal diseases, there were no outstanding new developments.

Alkaloids and other plant extracts have long been important manufactured items in Germany, and large quantities were produced during the war. Caffeine was made from theobromine until cocoa imports were cut off, then a purely synthetic process was mainly used. Similarly, when imported opium could no longer be obtained, lower yielding domestic poppies were employed.

Hormones and vitamins, both synthetic and natural, were apparently in large demand and production in Germany. In a number of instances technical improvements had been made in their method of manufacture. Attempts to synthesize vitamin A were not successful.

The types of equipment used for drug manufacturing were not greatly different from those used elsewhere. However, the scale of operations was generally smaller than in the United States; for example, kettles, tanks and stills were usually not larger than 1,000 or 2,000 litre capacity, except in the cases of large volume drugs such as salicylates. Acetanilide and aminopyrine, of which very large amounts were still produced, and the sulfa drugs, were made in equipment of only moderate size. Meticulous care was given to purifications of the final products, and to the forms of the end products.

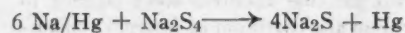
#### MISCELLANEOUS

The above classification although touching on some of the more important fields of the chemical industry of Germany does not by any means cover the entire field.

In the extensive field of dye chemistry many definite improvements in technique and synthesis were discovered in the various types of dyestuffs and intermediates.

In the field of solvents, in addition to the halogenated ethylene derivatives manufactured in such large quantities from acetylene, other interesting developments were uncovered. For example, hexyl alcohols were produced from acetaldehyde and butyraldehyde by alkali condensation followed by hydrogenation. Methyl pentane diol and triol were produced in considerable tonnage by converting acetone to diacetone alcohol and hydrogenating this chemical. These latter products found uses as solvents for lacquers.

Sodium amalgam drawn from the mercury cell for chlorine manufacture was reacted with sodium polysulfide (made from one quarter of the sodium sulfide produced) to give a very pure sodium sulfide, while the mercury was returned to the cell for re-use thus:



The use of substituted carbazoles as insecticide ingredients led to the development of some novel methods of synthesis.

The use of hydrazine hydrate as a rocket fuel, as mentioned above, resulted in translating the usual laboratory synthesis of oxidizing ammonia with sodium hypochlorite to a large full-sized industry.

The need for thiodiglycol as an intermediate for mustard gas production led to the production of this chemical by a continuous process from ethylene oxide and hydrogen sulfide in considerable tonnage.

The synthesis of caffeine by the well known Traube synthesis, which starts with urea and sodium cyanoacetate to form diamino uracil followed by reaction with excess formic acid and exhaustive methylation, was reduced to industrial practice for the production of this valuable drug.

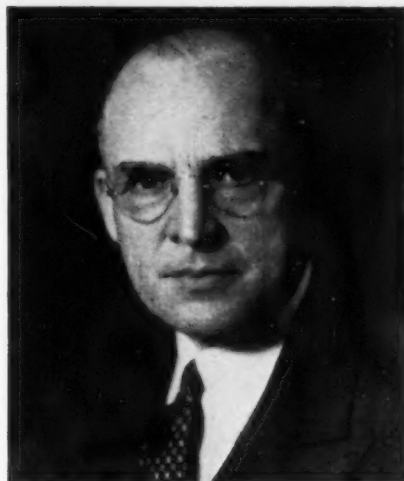
Diazoaminobenzene and azo substituted compounds made from ketones were produced as additives for rubber compounding. These products at temperatures encountered during vulcanization decompose to give large and even supplies of nitrogen useful for making lightweight sponge rubbers.

This list of developments could be amplified very considerably but such extension would fall beyond the scope of this preliminary report. It is to be hoped that the detailed information itself can soon be made available for general use, because it is certain that much of this data will supply valuable ideas for the future development of the American chemical industry.



**NILS ANDERSON, JR.**, formerly plastics section chief, Chemical Bureau, War Production Board, has joined the Casein Co. of America, division of the Borden Co., as vice-president.

## HEADLINERS in the NEWS



**ISAAC FOGG**, former treasurer, succeeds Leland Lyon, who resigned to become chairman of the board, as president of Atlas Powder Co.



**DONALD BABCOCK KEYES**, director of the Office of Production, Research and Development of the WPB will receive the Honor Scroll of the A. I. C., Oct. 26.



**SIDNEY D. KIRKPATRICK**, editor of Chemical & Metallurgical Engineering will receive the Chemical Industry Medal for 1945 in November from the S. C. I.



**HAROLD BLANCHE**, Celanese Corp. of America, was recently named president. Camille Dreyfus became chairman of the board and W. M. Cameron, vice chairman.



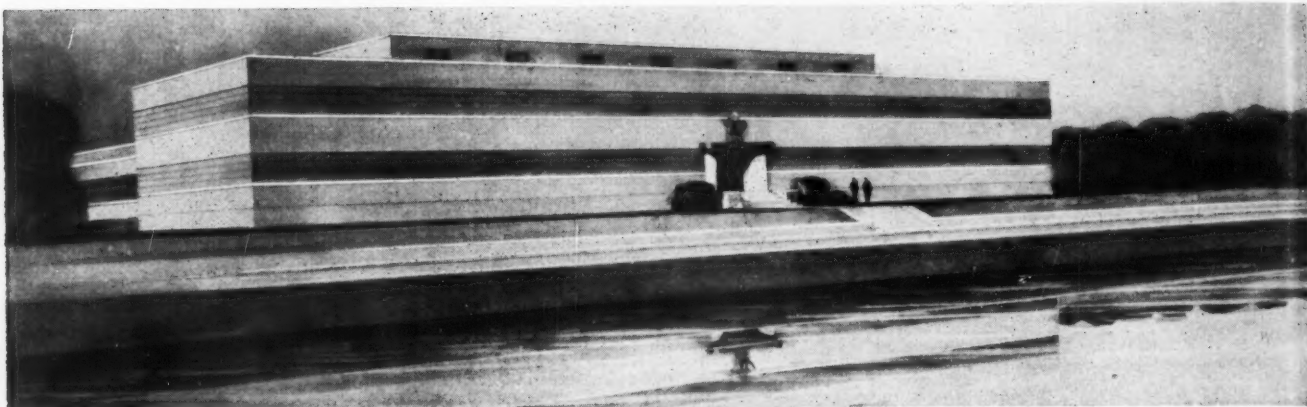
**RAYMOND E. KIRK**, head of the department of chemistry and dean of the graduate school of Polytechnic Institute of Brooklyn, has been chosen chairman-elect of N. Y. section ACS.



**MAHLON G. MILLIKEN**, who was previously general manager of the cellulose products department of Hercules Powder Co. has been named a vice-president.



**WILLIAM R. ELLIS** has been elected a vice-president of Hercules Powder Co. Associated with the company since 1915, Mr. Ellis was general manager of the explosives dept.



A \$2,000,000 research laboratory and experimental center will be erected immediately by the Allegheny Ludlum Steel Corp. at Breckenridge, Pa.

## DDT Discoverers Visit United States

Upon invitation of the federal government, three Swiss scientists who were in the vanguard of DDT insecticide development have been conferring with officials in this country, exchanging information and visiting several governmental and private laboratories. Dr. Paul Lauger (left) is director of research of J. R. Geigy, S. A., and was responsible for the direction of developmental work which led to the emergence of DDT insecticides in 1939. Dr. Paul Muller (right) invented DDT insecticides and was associated with Dr. Lauger in their development. Dr. Robert Weisman (center), who published the first important papers on DDT's effectiveness, is now chief entomologist of the Geigy firm in Switzerland.

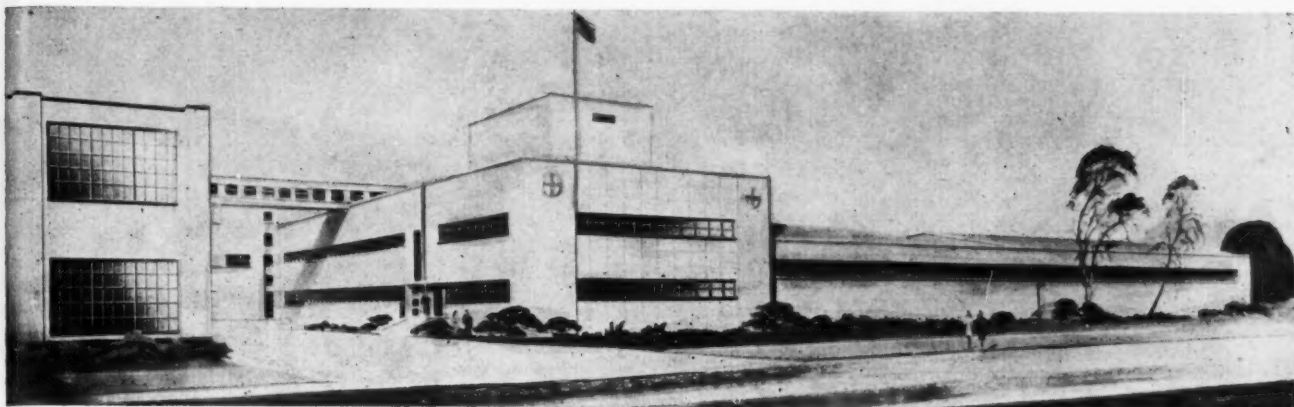


## Packaging Division of AMA Meets

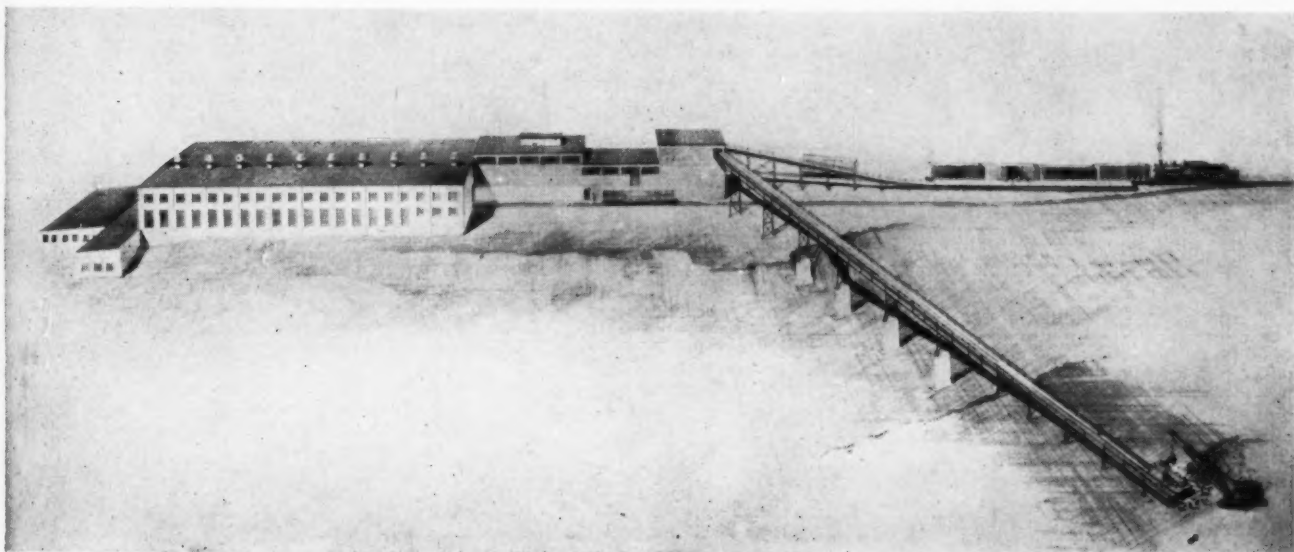
Convening at the Hotel New Yorker, September 18-19, the Packaging Division of the American Management Association discussed the impact of war problems on packaging materials and techniques. At top, left and right, respectively, are N. A. Fowler, General Box Co., and Commander Boyd R. Lewis, who told of the Navy's experiences with materials handling and warehousing methods. At left below is E. A. Throckmorton, Container Corporation of America, who discussed the peacetime possibilities of V and W boxes. Next is H. T. Holbrook, War Department, who reviewed military specifications. C. E. Waring, Davison Chemical Co., is at the bottom right. In addition to the prepared addresses, a feature of the two-day session was a packaging problem clinic, where several experts sat as a panel to discuss questions. This provided a convenient means of attacking individual problems, the importance of which did not warrant complete papers.



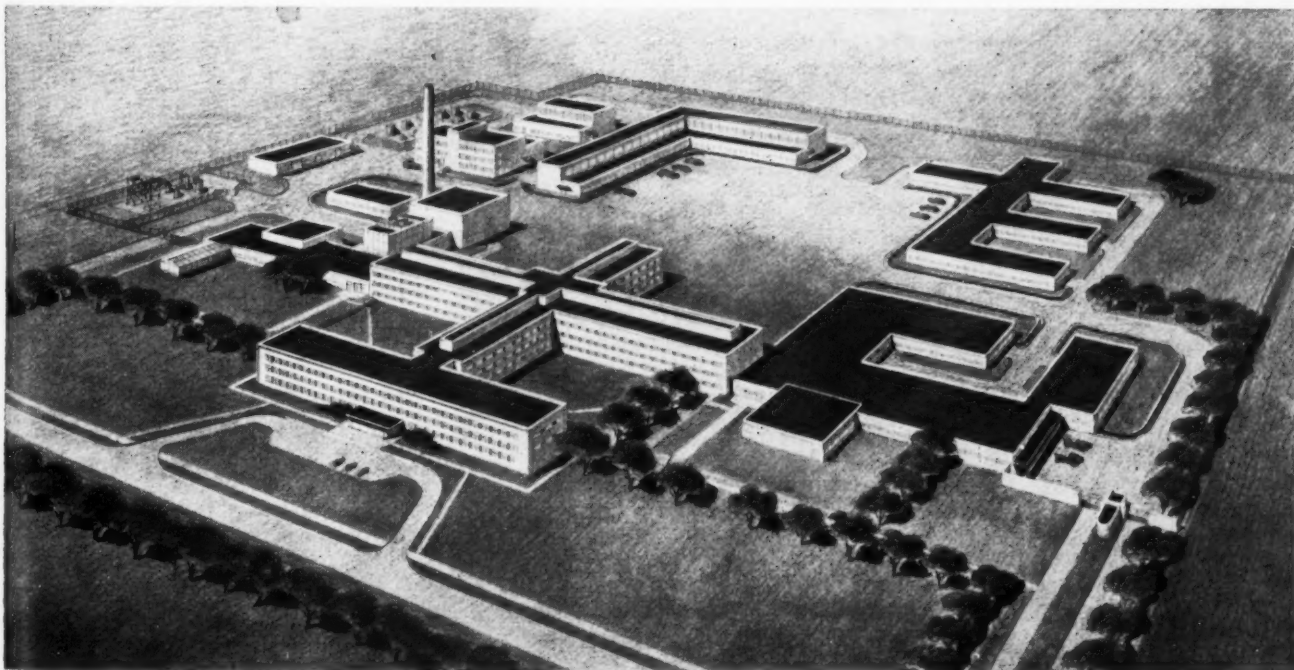
# or Postwar Expansion



Architect's conception of Sterling Drug's \$1,600,000 aspirin plant at Trenton, N. J., first project of a \$6,000,000 program.



Excavation is already under way in Hammond, Ind., for construction of new petroleum research laboratories by Standard Oil Co. of Indiana.



A \$4,000,000 expansion program of the St. Regis Paper Co. at Deferiet, N. Y., will provide large-scale production of bleached groundwood pulp.

## Mask Protects Chemist From Fumes

The chemist shown at right is wearing a new type of breathing apparatus developed by the Scott Aviation Corporation. Called the Air-Pak, it was used throughout the war with portable oxygen equipment in high altitude flying. The "walk-around" bottle, as it was popularly known, permitted personnel to move from place to place in the ship, as utilization of permanent oxygen installations was unnecessary. This equipment adapts normal breathing air—not oxygen. The working principle is that the air is stored under pressure in a compressed air cylinder.



## Tube Detects Atom Bomb Radiations

Use of Geiger-Muller tubes by scientists at the New Mexico scene of the first atomic bomb explosion in surveying the area for possible dangerous after effects has heightened interest in this delicate electronic device designed specifically for detecting minute pulses of invisible radiation. The formation of a single ion pair anywhere within the active volume of a counter tube releases a flow of current which can be translated into a meter reading. In its simplest form, the Geiger-Muller tube, like the pictured example from the North American Philips Co., Inc., consists of a central wire electrode and a concentric cylindrical metallic electrode separated by an atmosphere of noble gas such as argon and often containing an organic quenching additive such as alcohol to terminate the pulse once the "triggering" flow of radiation has ceased.



## Plexiglas Progresses From Bomber to Bath

First used for nose sections, turrets and other enclosures in every type of army and navy plane, Plexiglas, made by the Rohm & Haas Co. of Philadelphia, has moved into the field of home design. In the modern bath at right we see a shower which can be controlled from the outside as well as inside and is ventilated from above. The old fashioned shower head is replaced by four bands of needle sprays. Floor-level bath scales are read on a dial above the plastic towel rack. Over the sink, also made of plastic, is a plastic mirror which cannot fog.





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# BETWEEN THE LINES

## Corn As a Chemical Raw Material

*Industrial use of corn accounts for consumption of 130,000,000 bushels annually. Both private producers and the Department of Agriculture expect new products now in the development stage to increase this amount over the years.*

**B**Y THE time this appears, the complete returns on the 1945 corn crop probably will be available. The nation's industries will know if they can draw on—as anticipated—a bumper 3 billion bushel crop. The final figure is due in October.

Corn is associated in the popular imagination primarily with livestock feeding, or perhaps with potables. Actually corn is a prime factor in our chemical, metal, and heavy industry operations to an extent not known elsewhere in the world. Industrial use of corn has accounted for consumption of 130,000,000 bushels annually in recent years.

molders amounting to 150,000,000 pounds of starch annually.

Some other figures on the war and industry consumption of cornstarch are: chemicals and explosives, more than 50,000,000 pounds of starch annually, in such production as dynamite and nitrocellulose (cornstarch flaked and soaked in nitroglycerine furnishes high caliber propellants) more than 10,000,000 pounds of cornstarch annually is need for production of aluminum and other critical metals, where it is used as a flotation agent for purification of alumina.

Still other cornstarch uses are: drugs, vitamins, 30–40,000,000 pounds; butyl

flour, meal, etc., would include abrasives, airplane dopes, antiseptics, anti-oxidants, asbestos, dry batteries, boiler compounds, spark plugs and insulators, solvents, detergents and other chemical agents, chloroform, iodoform and other chemical raw materials, lactic acid, ascorbic and other commercial acids, core binders, cordage and twine, denatured alcohol, explosives, hydraulic brake fluid, fibrous glass cloth, insecticides, leather tanning, oil-well drilling agents, penetrating oils, ore flotation agents, rubber goods, substitutes, synthetics, hot patches for tire repair, penicillin, pharmaceuticals, sizing for brake lining, paper sizing, synthetic resins, dyes, industrial crayons, paints, varnishes, shellac and other protective coatings, plastics and molded products, paint, varnish and rust removers, glass, cork products, sealing agents, shoe pastes and polishes, and many others.

Production of butyl alcohol was, of course, one of the vital war activities in which corn was indispensable and through which it entered many other products. Through butyl alcohol, corn provides butyl acetate, an important lacquer solvent. As dibutyl phthalate it enters smokeless powder and plastics as a plasticizer. Butyl alcohol went into the production of aviation gasoline as a rust inhibitor and stabilizer and as a gum-inhibitor. It also goes into rubber and photographic film.

Use of corn steep liquor enabled manufacturers last year to quadruple production of penicillin. Corn products are used in the manufacture of sulfa drugs and aspirin. In manufacture of paper and products, the war years saw 300,000,000 pounds of starch and dextrines used annually.

Production of V-board containers alone accounted for use of 100,000,000 pounds of starch and dextrines annually; sizing paper products took 200,000,000 pounds more. Cornstarch is used in cloth sizing, as a finisher for duck, denim, as a treatment for surgical dressings. It enters production of fiber glass cloth used in aircraft brake linings; a unique war use was in camouflage cloth coloring, as an ink.

Its use in adhesives is obvious, and the war has seen development of a number of new plywood adhesives.

For many of these uses corn has no substitute. All penicillin produced in this country, at least during the part of the year covered by this article, was derived from farm products. It was estimated early in the calendar year 1945, that about 6,000,000 pounds of lactose and about 12,000,000 pounds of corn-steep liquor would be used to manufacture around 3,500 billion units of penicillin.

There is great interest industrially in possibilities of starches other than corn. Much of this interest is centered in the production of allyl starch from potatoes, which is regarded as having possibilities as a coating. It is claimed to form the



*Corn steep liquor is mixed with milk sugar to make the culture medium used in the commercial production of penicillin. About 3½ million lbs. of corn steep liquor are used per trillion units of penicillin grown.*

Only a little over a year ago, corn was such a vital element in war production that the most drastic controls in national history were placed on its use. At that time a corn shortage actually threatened the entire war production program.

Its almost universal use in war is seen in its part in foundry work—the casting and molding of bronze, steel, aluminum, magnesium and other metals. Starch from corn is used for core binders and

alcohol, 3,000,000 bushels (of corn); paper and paper products, 300,000,000 pounds; textiles and cotton rayons, 300,000,000 pounds; adhesives, more than 100,000,000 pounds; corn syrup, more than 25,000,000 bushels of corn. All figures are annual and for cornstarch except where noted.

A wartime list of essential commercial uses of corn or corn products, including end products using cornstarch, corn meal,

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basis of a "very high quality, resistant, varnish type of material" in the words of an Agriculture Department research official.

The official opinion on this allyl starch is that it is too soon to determine how far it may go in actual industrial use. It is known that a large number of companies were actively experimenting with it, and it was stated to have very unusual properties lending themselves to a wide range of commercial uses.

The Peoria laboratory of the Department of Agriculture has developed a process for manufacture of wheat starch, among other wheat products, which also holds much industry appeal. A gluten byproduct is used in manufacture of glutamic acid and sodium glutamate, incidentally, furnishing valuable food products, but the wheat starch process is essentially uncomplicated, it is stated.

From a bushel of wheat, for instance, there is normally recovered approximately 30 pounds of starch, depending on the type of wheat used, which is roughly equivalent to corn. However, the establishment of a permanent starch industry based on wheat is difficult because of price factors. Wheat, in most producing areas, sells for more than corn per bushel.

This is not necessarily true in the Pacific Northwest, where wheat has sold for less than corn. It is possible, in the opinion of some Department officials, to establish a going wheat starch and syrup industry, which would have its outlets in the West naturally, supplying such products from closer at home, which normally have come from the Chicago area. Some movement in that direction already is reported.

Although wheat has undersold corn in the Pacific Northwest for the past 15 years, the cornstarch, dextrose and syrup industry in this country has been largely based on corn. In any case, there is already evident a fear of the return to surpluses of both wheat and corn with the end of the abnormal consumption engendered by the war.

From an individual producer who has done some experimenting, it is reported that one bushel of either corn or wheat contains approximately 30 pounds of starch, as stated by Department of Agriculture, and this producer details some results obtained in various conversions: one bushel for corn or wheat, plus 15 gallons of water, a small amount of malt and yeast, produces 2¾ gallons of alcohol, 20 pounds of dried livestock food, "plus other byproducts of even greater value, research for which is only now really getting under way."

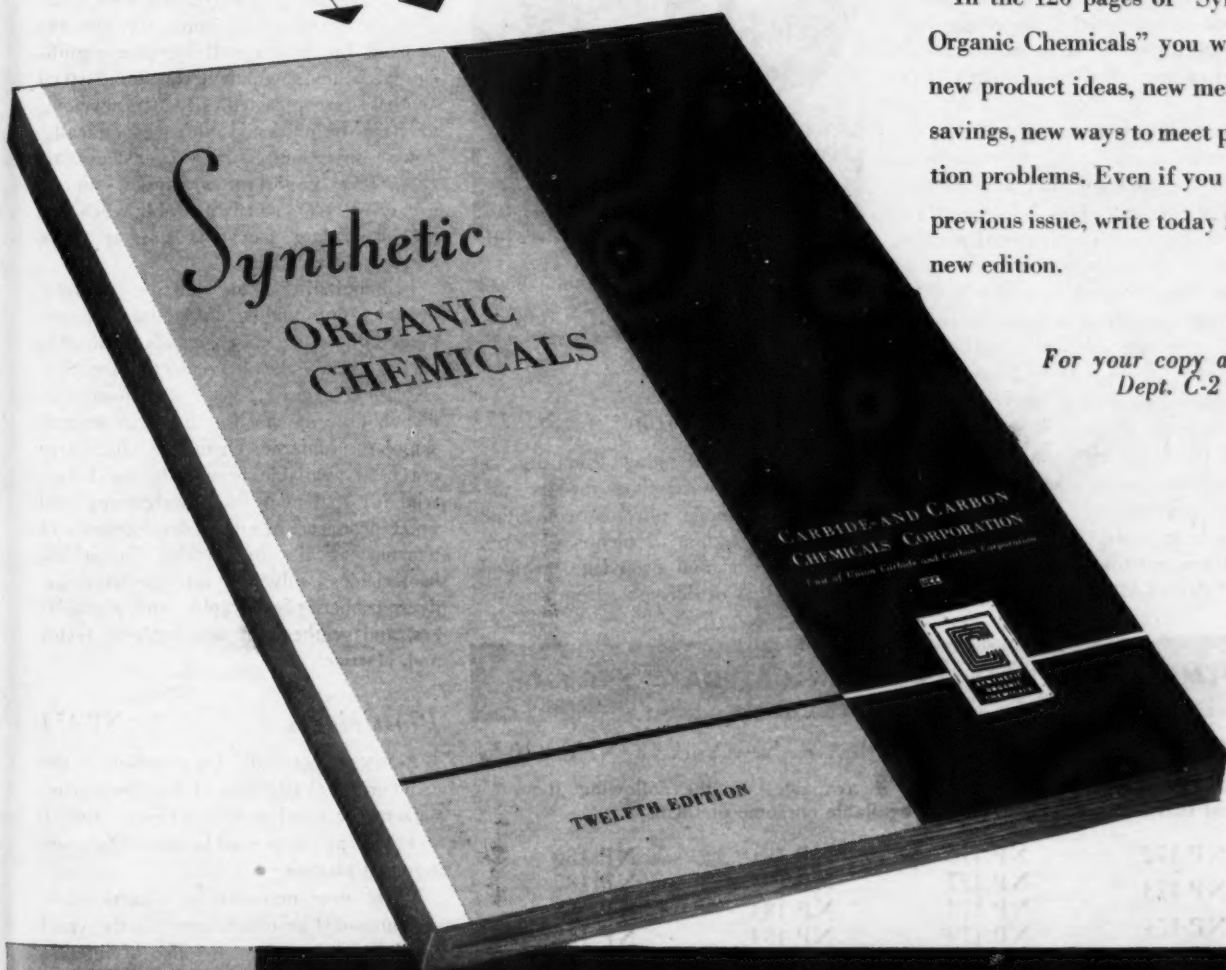
This plant, located at Omaha, is experimenting in the conversion of starch to alcohol, which it is claimed has been proved in the plant, and which experiments are looking to reducing costs with an eye to postwar demands for a cheap alcohol in synthetic rubber production, new fuel uses, and other new production.

34

*new chemicals*

5

*new chapters*



...have been added to the 12th Edition of this well-known catalog. Such recently developed products as allyl alcohol, glyoxal, ethylhexanediol, and pentanedione are included in this important reference manual of aliphatic chemistry. The new chapters feature acetals, sulfur compounds, "Cellosize" hydroxyethyl cellulose, polyethylene glycols, and "Flexol" plasticizers. As in previous editions, uses, specifications and properties of each chemical are presented in condensed, easy-to-read form.

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# NEW PRODUCTS & PROCESSES

## Kriston New Goodrich Plastic NP 172

A NEW non-flammable thermoset plastic with excellent optical and electrical properties, good resistance to abrasion, and high resistance to oils and greases and most chemicals, including acids and alkalis, is announced by The B. F. Goodrich Chemical Company, Cleveland. The new material has been named Kriston.

Kriston monomer is a somewhat viscous, water-clear, anhydrous liquid having a specific gravity of 1.25, which can be cast in simple molds. It sets to a hard, heat-resistant plastic. No water or other volatile products are released during the polymerization, making easy the preparation of dense, non-porous articles. Shrinkage during polymerization is substantially lower than that of any other known material of the type.

Kriston polymer, according to Sam L. Brous, sales manager of thermosetting resins for the company, has a refractive index of about 1.57. This is higher than most optical glass. The material can be made into a water-clear plastic or made in a wide range of colors which can be transparent, translucent or opaque. It has high dielectric strength and electrical resistivity, and promises to find many valuable applications in the electrical field. Its resistance to abrasion is much higher than the thermoplastics, making possible its use in places where plastics heretofore have been unsuitable.

In its cast state, Kriston is odorless, tasteless, nontoxic and dimensionally stable. After molding, it can be worked

on standard machining and polishing equipment.

The company plans to offer Kriston only in the liquid monomer state and does



not expect to do any fabrication, but is anxious to work closely with manufacturers in developing new products made from this raw material.

## Olefin Amination NP 173

The Sinclair Refining Company has developed a new method for the production of organic nitrogen compounds by direct amination of olefins. For example, ethylene and propylene, available in refinery gas or derivable from propane,

are reacted with ammonia to produce nitriles and amines. E. W. Isom, vice-president, directing the Research and Development Department, announces the process and cites United States patents numbered 2,381,470, 2,381,471, 2,381,472, 2,381,473 and 2,381,709 which issued on August 7th. Numerous other applications for patent which describe new chemicals and processes are pending.

The new process accomplishes organic nitrogen fixation by a catalytic reaction of ammonia with components of refinery gases which are now used for fuel; the direct amination employs the lowest cost sources of both reactive nitrogen and carbon compounds. Acetonitrile, propionitrile and butyronitrile are the primary products from ethylene and propylene. Pilot plant operation has established the production of these compounds and many derivatives as pure chemicals.

Acetonitrile, acrylonitrile and ethyl, isopropyl and normal butyl amines are examples of known industrial chemicals which can be manufactured economically by the new process. Acrylonitrile is produced now for polymerization with butadiene to yield oil resistant rubbers, the demand for which will increase significantly. Many new polymers and industrial syntheses are expected as soon as acrylonitrile can be produced more economically. Amines are required for rubber chemicals and other important syntheses, and a greater development is probable when this important class of organic bases are more extensively available.

Propionitrile, butyronitrile, normal propyl amines and isobutylamines are new potentially industrial chemicals. A market survey is now being conducted for Sinclair by Harshaw Chemical Company as distributing agents for information and samples. Numerous chemicals which have not been available previously for industrial use and many new derivatives hold great promise for future developments of pharmaceuticals, insecticides, fungicides, bactericides, solvents, intermediates for dyes, rubber, photography, and plasticizers, and synthesis of new rubbers, resins and plastics.

## Plasticizers NP 174

Ameco Chemicals, Inc., announces the commercial availability of four new plasticizers for vinyl resins, synthetic rubber and other products used in protective coatings and plastics.

These new materials are particularly recommended as plasticizers for the vinyl copolymers, but they are also of interest in combination with other plastics and resins and in synthetic rubber. They are all insoluble in water and are compatible with most commercially available resins and elastomers.

Plasticizer 7-2 is outstanding in having high plasticizing power, low volatility at elevated temperatures, and extreme low

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Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 172	NP 176	NP 181	NP 186
NP 173	NP 177	NP 182	NP 187
NP 174	NP 178	NP 183	NP 188
NP 175	NP 179	NP 184	NP 189
	NP 180	NP 185	NP 190

Name ..... Position .....

Company .....

Street .....

City & State .....



## Nuchar Activated Carbon Purifies Dye Intermediates

IN THE manufacture of dye intermediates and allied chemicals, Nuchar Activated Carbon is a most effective tool for purifying these products. Nuchar removes, by adsorption, foreign odors and colors, improves the purity of the product by removing undesirable organic side-products and impurities,—thereby producing compounds with greater market and sales appeal. In no way is the molecular structure of organic compounds affected after treatment with Nuchar Activated Carbon, and purification by adsorption is definitely an economical process.

Some typical Dye Intermediates in which Nuchar Activated

Carbon may be used to advantage are:

Acetanilide	Aminoanthraquinone
Alpha and Beta Naphthol	Alpha and Beta Naphthylanine
Salicylic Acid	Aminoazobenzene
Resorcinol	Michler's Ketone

Because of its tremendous adsorptive ability, Nuchar Activated Carbon has found wide acceptance in purification processes of the chemical industry. Our technical staff is constantly at work on purification problems of newly developed chemicals and will gladly assist you. Write today for a generous sample.

*Nuchar Activated Carbons ★ Abietic Acid ★ Snow Top Precipitated Calcium Carbonate ★ Liquid Caustic Soda ★ Chlorine Indulin (Lignin) ★ Ligro Crude Tall Oil ★ Indusoil Distilled Tall Oil ★ Tall Oil Pitch ★ Sulphate Wood Turpentine*

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	<div> <div> DIVISION WEST VIRGINIA PULP AND PAPER COMPANY  230 PARK AVENUE  NEW YORK 17, N.Y. </div> <div> 35 E. WACKER DRIVE  CHICAGO 1, ILLINOIS </div> <div> 748 PUBLIC LEDGER BLDG.  PHILADELPHIA 6, PA. </div> <div> 844 LEADER BLDG.  CLEVELAND 14, OHIO </div> </div>		

temperature flexibility. Plasticizer 7-2 has better low temperature characteristics than dibutyl and dioctyl phthalates and tricresyl phosphate, and is less volatile at elevated temperatures than both of the phthalates.

Plasticizer 11-2 is practically equivalent to dioctyl phthalate when used with vinylite VYNW. It has excellent plasticizing properties, good low temperatures flexibility, and low volatility at elevated temperatures. Plasticizer 11-2 is superior to tricresyl phosphate in plasticizing action and low temperature flexibility, and is much less volatile than dibutyl phthalate.

Plasticizer No. 8 is about equivalent to dioctyl phthalate in plasticizing action but is superior on low temperature flexibility. Plasticizer No. 8 has a tendency to decompose when heated for long periods of time at high temperatures and is therefore more suitable in coatings which are spread on from solvents or emulsions than in calendered goods.

Paroil 177-K is unusual in its plasticizing action on vinylite VYNW in that much higher proportions are required than is the case with other commonly used plasticizers. Since Paroil 177-K is very inexpensive, the use of such high proportions is a decided advantage from the cost standpoint.

Paroil 177-K is also recommended for use in combination with dioctyl phthalate and other solvent type plasticizers in vinylite VYNW.

### *German Cutting Alloy*

NP 175

The Germans developed a new super-cutting alloy during the war which required no tungsten and thereby released that valuable metal for other purposes, according to Prof. Gregory Comstock, director of research at the Powder Metallurgy Laboratory, Stevens Institute of Technology.

The new cutting material which the Germans developed consists essentially of vanadium and titanium carbides bonded with metallic nickel, Professor Comstock states. His data also includes figures, covering Germany and Austria, for the production of the new alloy, thus making available for the first time authentic information as to the amounts in which the new material was available.

### *Silastic Moldings*

NP 176

Silastic parts—gaskets, seals, hose, rubber-to-metal adhesion and miscellaneous pieces—are now available commercially. Production of these molded parts was undertaken by the Connecticut Hard Rubber Company in cooperation with the Dow Corning Corporation, which developed this new high-temperature elastic material described last month in these columns.

Silastic opens many new prospects for the designers of essential equipment, but

such pieces must be carefully engineered and frequently reinforced with glass fabric. Connecticut Hard Rubber engineers are available for advice and consultation in exploring the possibilities opened up by this new material.

### *Wallboard From Sawdust*

NP 177

Developed to reduce the loss in the cutting of wood, a new process which provides a means of utilizing every part of a log is ready for quantity production, according to Dr. Donald F. Othmer, head of the Department of Chemical Engineering at the Polytechnic Institute of Brooklyn, and Warren R. Smith, research engineer of Crown Point, New York.

With the new process, the announcement said, 2,000 square feet of first-quality, strong, water-resistant wallboards may be obtained from one ton of sawdust.



The sawdust can be conveyed directly from the saw to a mixer where a chemical, which also comes from wood, is added. A minute or two for mixing is required and not more than ten minutes for making the board by squeezing the mixture in an hydraulic press. The whole operation is a matter of less than 15 minutes from the saw to the sawdust and to the finished board.

The simple chemicals which make the process possible cost less than one-tenth of a cent per square foot and are themselves a waste by-product of wood utilizing industries.

Besides sawdust, these boards may be made from other wood waste, such as chips, shavings, and the waste material from sugar cane called "bagasse."

### *Room-Temperature Setting Adhesive*

NP 178

Announcement of a new room-temperature setting resorcinol adhesive which develops the joint strength, moisture resistance and durability usually associated only with hot press phenolics is made by

the Resinous Products & Chemical Company of Philadelphia. Known as Amberlite PR-115, this resin is suited to bonding applications where speed of cure, good adhesion to relatively impervious surfaces, good gap filling qualities and the ultimate in durability are important requirements. Originally developed for gluing wood to wood, the resin shows good adhesion to laminates, rubber and transparent plastics.

The ability of Amberlite PR-115 to cure at moderate temperatures plus its fast cure at elevated temperatures has made it especially well adapted to radio frequency gluing equipment.

High frequency gluing equipment has so broadened the field of use for these resin adhesives that the designer and engineer will find that many former limitations on the use of glued wood constructions have been largely overcome.

This resin has been approved for use under Army Air Forces Specification 14124 (superseded June 1 by specifications 14140) and Bureau of Aeronautics Specification G-33, Type I. It is recommended for use in conformance with Bureau of Ships Specification 52-G-12.

### *Tire Paint*

NP 179

A new black tire paint, marketed in one and five gallon cans is announced by The B. F. Goodrich Company, Akron, Ohio. Up to nine gallons of paint can be obtained from one gallon of the concentration when mixed with gasoline.

Many uses for the new paint are outlined by the company. These include application to tires after repairs or recapping to restore original "factory finish," and use after wash or wax jobs to touch up the tires. Floor boards and running board matting are also improved in appearance and given longer life by application of the paint.

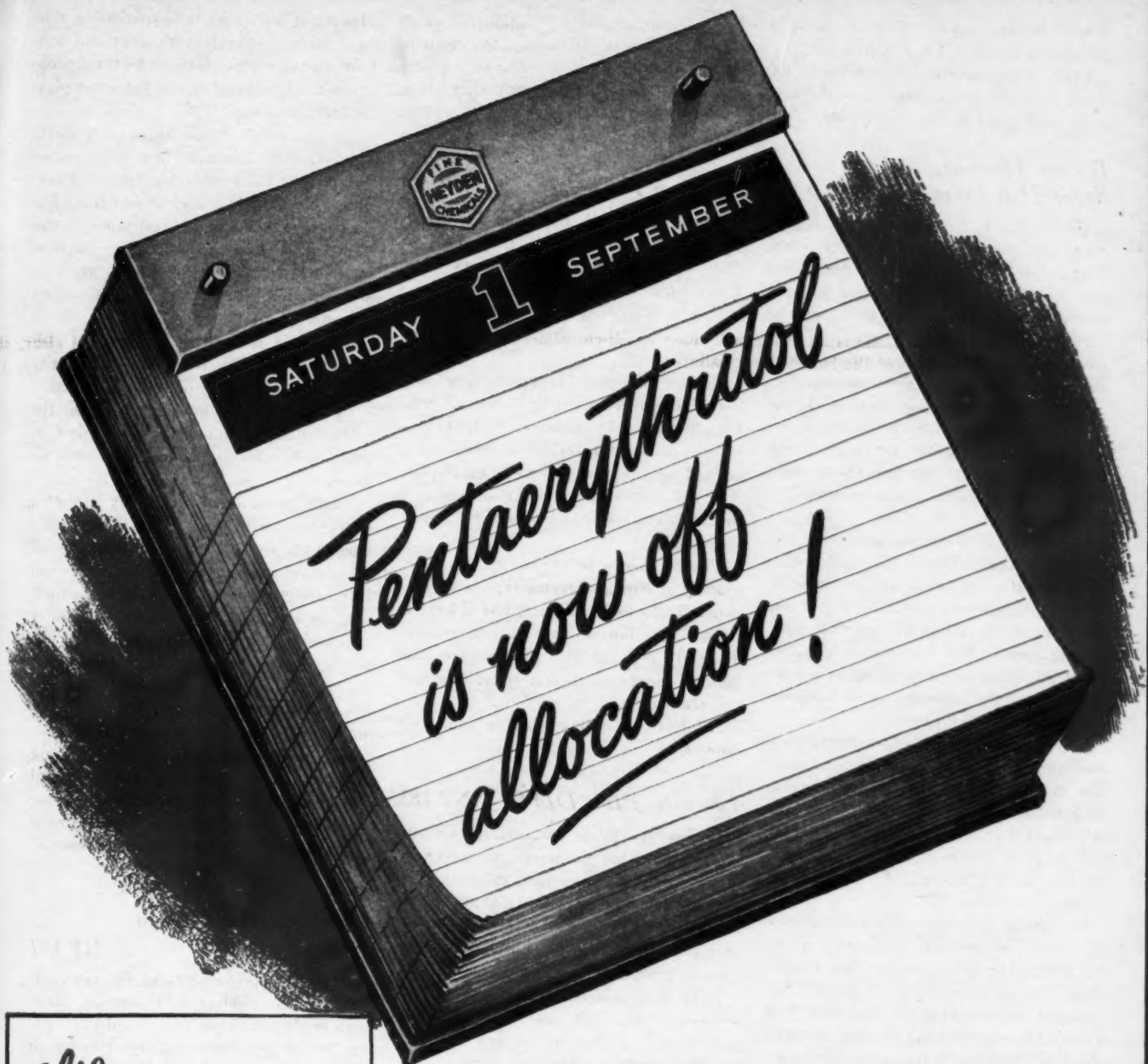
### *New Sulfa Drug*

NP 180

A new group of sulfonamides, never before tested for anti-bacterial properties, has shown itself to be almost as effective against a sulfonamide-resistant strain of gonococcus as against other strains, report G. R. Goethius and C. A. Lawrence of Winthrop Chemical Co., Inc.

Another important property of this group is its complete indifference to para-aminobenzoic acid. The acid, present in the gastro-intestinal tract and in pus, inhibits the action of many of the sulfa compounds, seriously reducing their effectiveness.

Discovery of a second line of attack against the bacteria being fought with both sulfa and penicillin is a research problem that might become acute at any time. Since the advent of the sulfas there have appeared, from time to time, epidemics of sulfa-resistant bacteria. Even the bugs that ordinarily succumb docilely to the powerful sulfas occasionally develop a protection and, for awhile, put up a suc-



*also*

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Wartime coating uses have amply demonstrated that Pentaerythritol enhances the quality of resins and varnishes.

PENTEK\* finishes are equally outstanding as protective coatings for automobiles, refrigerators, washing machines, farm implements and similar articles requiring tough, lasting protective coatings as for ships, tanks, trucks, jeeps and other military equipment.

Samples and technical information available on request.

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cessful defense against them, creating a perplexing problem for research.

Clinical tests are now being conducted using the most active member of the new group, sulfanilyl-3,5-dibromoanilide.

### **Boron Increases Steel Hardness** NP 181

Confirming the wartime experience of many steel plants in the United States, the Bureau of Mines has made public a report on its own metallurgical experiments showing that boron increases the hardness of steel and is an adequate substitute for some of the hard-to-get alloying metals needed in steel-making.

Pinch-hitting in certain alloy steels for scarcer elements such as chromium, nickel and manganese during the war, boron also can be used to produce fine-grained steel of good forging characteristics, the Bureau's report points out.

One of the striking advantages of this newly-developed alloying element is that small quantities of boron will do the work of much larger amounts of some of the other common alloying materials, the Bureau found. For instance, it requires about 260 times as much nickel as it does boron to get the same degree of hardness in a given quantity of steel.

The Bureau of Mines experiments were conducted in the Metallurgy of Steel Section at the Central Experiment Station in Pittsburgh, Pa., and the results are incorporated in a paper by R. B. Corbett and A. J. Williams, which was released by Dr. R. R. Sayers, Director of the Bureau.

In listing the various characteristics of boron and its use as a steel alloy, the Bureau metallurgists warned that it should not be considered a "cure-all" for improper steel-making practice, but that it should be regarded as any other element added to steel to increase the hardness. In addition, there is a limit to the increase in hardness due to the addition of boron, and properties other than hardenability must be supplied as formerly by elements other than boron.

### **Margaric Acid and Halides Available** NP 182

Chemicals offered for the first time by Columbia Organic Chemicals Company, Inc., are margaric acid; 1,1,3,3-tetrachloropropene; 1,1,1,2,3,3-hexachloropropene; and ethyl trifluoroacetate.

### **Soap Removes Lacquer, Paint** NP 183

A new soap, called "Lackeroff," is said by its manufacturer, the Potter Paint Co., to remove lacquer, paint, varnish, adhesives, resins, and other materials from the hands without the use of volatile or irritating solvents. Consequently, the hands are not roughened and dermatitis is prevented.

The soap is said to contain no harsh alkalis, acids, nor abrasives, the cleaning being accomplished by dissolution and emulsification of the foreign matter. It is said to eliminate the need of protective hand creams.

### **Rubber Finishes** NP 184

New beauty and protection for rubber products is claimed by S. C. Johnson & Son, Inc., the makers of Johnson's Wax. Economical and easy to apply, Johnson's rubber finishes help retard oxidation and sun-checking, thus lengthening rubber's life.

Rubber products keep their new look longer when protected by Johnson's rubber finishes. They resist dirt, fingerprints, scuffs and scratches when being packed and shipped, and while on display. The new Johnson product also acts as a dry lubricant for rubber parts, eliminating squeaks.

The finish can be applied by spraying, dipping or wiping. Drying time is short—generally 15 to 20 minutes, less if heat is used. The finishes are non-flammable. They are resilient to a high degree, and under ordinary conditions resist cracking and sealing.

A folder giving details will be mailed on request.

### **Thanite Plus DDT** NP 185

A new insecticide concentrate, Thanite plus DDT, that possesses an excellent quick knockdown and sure kill rating, is now available to insecticide manufacturers for effective civilian fly sprays for the first time, according to Hercules Powder Company officials.

DDT used in insecticide sprays gives an amazingly sure kill but has very slow knockdown, so slow as to be rated 0 in the Peet-Grady method of testing. By combining Thanite, which gives high quick knockdown and quick kill, with DDT, the most desirable qualities of each toxicant are utilized.

In addition, the time during which the knockdown and kill strength of the insecticide are effective is greatly extended by the combination.

### **Thermosetting Resin For Laminating** NP 186

Development of a new thermosetting resin, demonstrating all the advantages of the low-pressure type plus permanent flexibility, is announced by the Resinous Products & Chemical Company. Known as Paraplex P-10, the resin was designed primarily for the laminating industry but is also being used to impregnate single or multi-ply decorative fabrics and glass cloth, and as a casting or potting compound where fiber reinforcement is unnecessary.

Thermoset Paraplex P-10 without reinforcement is tough, flexible and slightly

elastic; it shows no deformation or flow over wide temperature ranges; and contains no extractible plasticizer—three properties not found together in any other plastic material.

Its permanent flexibility is particularly valuable with laminates which are based on cloth as the reinforcing fabric. Paraplex P-10 laminates also show higher impact strength and water resistance, better electrical and aging properties—particularly at high temperatures—than are possible through the use of the low or contact pressure resins now available.

The resin is a clear, stable, light colored fluid. Before use, a small quantity of lauroyl or benzoyl peroxide is added.

Because of the low viscosity of the resin, penetration into thick fabrics or flow into small recesses or voids presents no problem.

Single or multi-ply decorative fabrics, impregnated with Paraplex P-10, are being studied for such decorative and functional applications as automotive, airplane and furniture upholstery, wall covering, paneling, shower curtains, drapes and other uses where flexibility, light color and excellent resistance to water and ultra-violet rays are required. Paraplex P-10 is being tested as an impregnant for single or multi-ply glass cloth because of its excellent adhesion to glass, flexibility, aging properties, heat resistance and electrical resistance. These laminates should prove to be of especial value in the electrical field, in interior decorating and in numerous specialty applications.

### **Foamglas Insulation Improved** NP 187

Several improvements in the new cellular glass insulation, Foamglas, have been made during the past months according to an announcement by Pittsburgh Corning Corporation, manufacturers of the product.

One change increases the number of cells per cubic foot from 5,000,000 to 10,000,000, thus providing additional thermal protection.

The "K" value or conductivity of the original Foamglas was as follows:

K (Conductivity at 50° F.)—0.45  
B.t.u./Hr./Sq. ft./°F./In.  
K (Conductivity at 300° F.)—0.70  
B.t.u./Hr./Sq. ft./°F./In.

Values for the new Foamglas, which is also different in color, with the present product being brown instead of black, are:

K (Conductivity at 50° F.)— .40  
B.t.u./Hr./Sq. ft./°F./In.  
K (Conductivity at 300° F.)— .55  
B.t.u./Hr./Sq. ft./°F./In.

### **Urea Resin Glue** NP 188

A development of the Perkins Glue Company is the urea resin glue formula consisting of Perkins L-100 resin and catalyst H-20. Capable of long flour extensions, this resin glue provides assembly time exceeding twenty-four hours,

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permitting much greater flexibility in hot press production.

Catalyst C-85 is specified for cold press operations where a long assembly time, up to one hour, is required. The time in the press or under clamp pressure is not lengthened by using either of the above special catalysts. Details are available upon request.

## DDT Finishes

NP 189

Several types of DDT interior finishes have been announced by John Marshall, chemical director of the Fabrics & Finishes Department of the Du Pont Company.

The incorporation of DDT in finishes, Mr. Marshall said, considerably prolongs the effective life of the war-developed miracle insecticide.

Du Pont will not release its DDT finishes to the consumer until toxicological and service tests prove beyond question its suitability for household and institutional uses.

## Synthetic Enamels

NP 190

A new group of all-synthetic, hi-bake enamels that give an exceptionally hard, stainproof finish designed to endure heavy household usage has been developed by The Arco Company, according to Dr. Robert J. Hartman, director of Arco's Industrial Division.

These finishes, called Synox, are already being produced in several whites which have been thoroughly tested and adopted by household appliance manufacturers. One type is designed for refrigerators, deep freeze units, stoves, ironers and electric mixers, and another for dishwashers and washing machines.

Tests in the Arco evaluation laboratories and by industrial users have shown that these enamels have an unusual degree of water and alkali resistance, stain resistance and exceptional color retention. They resist normal fruit acids, vinegar, etc., and are not affected by dilute or concentrated alkaline solutions which frequently attack and discolor enamel coatings in common use.

The coating resists the action of hot soapy solutions without dulling or excessive softening or embrittlement and is said to have greater abrasion resistance and lower water retention than other enamels.

Synox has been successfully applied to clean steel, with or without primer, to aluminum, and to magnesium. When subjected to complete cycle testing on the Arco microknife and the Arco elongauge it has shown excellent adhesion to bare steel and to aluminum sheet that had been slightly etched with a phosphoric acid type cleaner.

Despite its extreme hardness, Synox has shown a flexibility which is more than ample to meet all service conditions.



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### SPECIFICATIONS AERO BRAND\* ACRYLONITRILE

Molecular weight 53.03

Colorless, mobile liquid

Boiling Point—

100% product: 77.3° C.

Boiling Range—AERO BRAND:

97% within 2 degrees

Density: 0.8004 gram

per cc at 25° C.

Solubility: 25° C.

Water in Acrylonitrile

3.4% by weight

Acrylonitrile in water

7.4% by weight

\*Reg. U.S. Pat. Off. Completely miscible in most organic solvents

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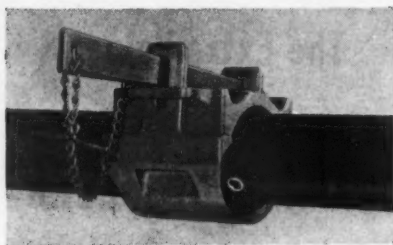


# NEW EQUIPMENT

## Pipe Couplings QC 631

Faster coupling of pipe at lower cost and with greater flexibility is claimed by Drinkwater, Inc., for their new line of flexible pipe couplings known as Drinkwater Presto-Lock couplings. Presto-Lock couplings are made in 11 sizes from 1¼" to 16".

An important feature of Presto-Lock couplings is that they can be used with



any plain end pipe without threads, grooves or flanges, only a hammer being required to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in the key channels.

The three simple parts of Presto-Lock flexible couplings are the two corrosion-resistant malleable iron castings and the quick-locking wedge key. Sizes 1¼", 1½", 2", 2½" and 3" are equipped with one wedge key and chain assembly to prevent loss of coupling parts. Sizes 3" to 16" have two wedge keys but no chain assembly. Synthetic rubber, neoprene and natural rubber gaskets are available.

Actual tests by the manufacturer show that Presto-Lock flexible pipe couplings give up to 40 degree flexibility at each joint, the coupling acting as a sleeve, elbow and ball union at all times. They can be used for repairing any size leak that the coupling will cover, withstanding all normal working pressures of gas, steam, oil and water.

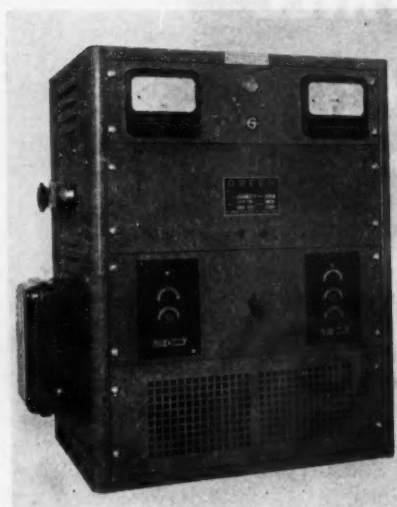
With Presto-Lock couplings any

plugged or frozen lines can be released immediately by a tap of the wedge key. Pipe can be readily turned if necessary and any section can be removed without affecting the remainder of the line. When not in use Presto-Lock couplings can be clamped together and carried as a unit. All coupling parts are salvageable upon relocation of pipe lines and gaskets can be readily replaced when they are worn out.

## Stabilized Low Voltage Rectifiers QC 632

Although high voltage low current rectifiers with electronic stabilization have been known for many years a further advance in the rectifier field—stabilized equipment with low voltage high current output—has been announced by the Green Electric Co.

The unit illustrated is rated at 200 am-



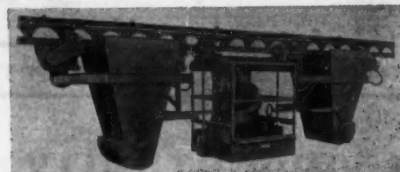
peres, voltage range 0-3 volts. Any voltage selected within the range is maintained to within 50 millivolts over load variation

from zero to 200 amperes, and with line voltage variation of  $\pm 10\%$ .

The voltage stabilization system includes motor-driven Powerstat and simple electronic pilot device and the principle is widely applicable to larger or smaller rectifier units.

## Bucket Carrier QC 633

A new motor-driven cab-operated double bucket carrier has been developed by The Cleveland Tramrail Division of



The Cleveland Crane & Engineering Co. for the transportation of dry bulk materials.

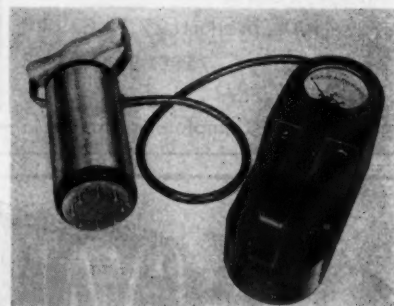
The operation of the carrier and the opening and closing of the bucket gates are handled by the cab operator who sits on a swivel chair, enabling him to work in the direction of either bucket. A single variable speed drum controller is located on one side of the cab, but two foot brakes are provided, one at either end so that one is always in convenient reach of the operator regardless of which direction he is operating the carrier. Push-pull levers for opening the bucket gates extend into the cab and permit emptying the materials in any amounts and at any rate desired.

The unit illustrated has two 25 cu. ft. buckets and is designed for carrying a total load of two tons. However, other sizes can be supplied. The buckets are designed and located with reference to the tramrail arch beam rail, so that they may be easily filled from overhead bins without interference or spillage.

The carrier is provided with two motorized travel drives, one at each end, and operates at speeds up to 600 feet per minute.

## Moisture Register QC 634

A new type moisture register is now available for testing a wide variety of materials having curved, rough or flat



surfaces. This new Model K-2, recently developed by the Moisture Register Co., incorporates a new type electrode equipped with buttons individually spring-cushioned to allow every button to maintain contact

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Please send me more detailed information on the following new equipment.

QC 631	QC 635	QC 539	QC 643
QC 632	QC 636	QC 640	QC 644
QC 633	QC 637	QC 641	QC 645
QC 634	QC 638	QC 642	QC 646

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**THE PATTERSON-KELLEY**  
*Company, Inc.*

EAST STROUDSBURG, PA.

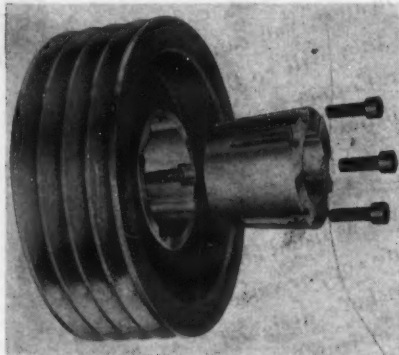
BOSTON 16, 96-A Huntington Avenue • NEW YORK 17, 101 Park Avenue • PHILADELPHIA 3, 1700 Walnut Street • CHICAGO 4, Railway Exchange Building  
REPRESENTATIVES IN PRINCIPAL CITIES

regardless of the contour of the material tested. It is in addition to the model long established for testing lumber and other flat surfaces.

The Model K-2 is especially adapted for testing the following materials: paper in stacks or rolls of varying diameters; bolts; rolls or stacks of cloth; rough lumber; plaster and other materials having curved or irregular surfaces. The K2, like all other Moisture Registers, operates on the principle of power absorption from a high-frequency oscillator circuit. An important feature of the instrument is its ability to determine low moisture percentages, providing readings down to zero percent. Moisture checks can be made in three seconds or less. The instrument is portable, weighs only five pounds, and is supplied with carrying case.

### V-Belt Sheave QC 635

The Taperlock V-belt sheave just released by the Dodge Manufacturing Corp. represents a new and effective means of



quickly mounting and demounting V-belt sheaves.

To install the Taperlock sheave, it is only necessary to slip the sheave and bushing assembly onto the shaft and tighten two or three locking screws depending upon the size of the sheave. The screws are in threaded engagement with the sheave hub and free in the bushing groove. As the screws are tightened, they push against the tapered bushing forcing it into the tapered bored hub. This causes the bushing to contract and wedge between the hub and shaft on which it is installed.

To remove the sheave from the shaft, the locking screws are removed and one or two of them are inserted in jack screw holes, which are partially in the bushing and partially in the hub. The portion of the jack screw hole in the bushing is threaded and that in the hub portion is unthreaded. As the screws are tightened, the bushing is dewatered and the sheave is free for removal from the shaft.

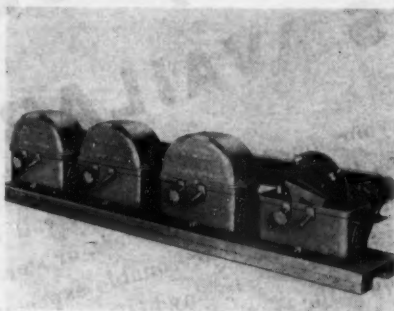
This construction offers many advantages. It provides a mounting of minimum dimensions for accommodation of the screws and their connection with hub and bushing. It permits the use of a flangeless bushing and eliminates any extension of either hub or bushing or any collars or protruding parts reducing weight and facilitates mounting and demounting.

The wedging action provided gives the equivalent of a shrunk-on fit on the shaft whether it is standard or normally under-size. The bushing extends the entire length of the hub providing a full bearing surface. Close mountings are made possible by elimination of flanges and collars.

### Multicompartment Feeder

QC 636

Most chemical and flotation processes require the distribution of several chemicals or flotation reagents, each in differ-



ent quantities, to many points in the circuit. Centralizing the point of distribution is frequently desirable and is more easily accomplished with the use of multicompartment feeders.

To meet the requirements for such a unit the Denver Equipment Co. has developed a new multicompartment feeder. It is a compact unit with a very accurate means of adjustment to provide accurate feed control. Each compartment is identical, in construction and operation, to the single compartment unit developed by Denver Equipment Co. The several compartments are driven by a single motor through a sprocket and chain drive.

Each of the compartments may be regulated independently. Feeder cups are bolted to a plate steel disc. The size and number of cups may be changed to vary the maximum feeder capacity. A convenient handwheel provides quick, "micrometer" adjustment of feed rate.

The multicompartment feeder provides a desirable flexibility in the distribution system. The same liquid may be fed from each compartment to different points in the circuit, or different liquids may be distributed to the same or different points in the circuit.

The Denver feeders are available in three sizes, each of which is made in simplex, duplex and multicompartment units. Special feeders for handling corrosive liquids and those which require heating for uniform viscosity are made.

### Transformer Welder QC 637

A new 200 ampere Wilson "Bumblebee" transformer welder, incorporating the latest features for economy in power consumption and high-speed, quality welding in an A.C. machine of medium capacity, has been announced by the Air Reduction

Co. Built-in capacitors make possible power economies up to 35 per cent.

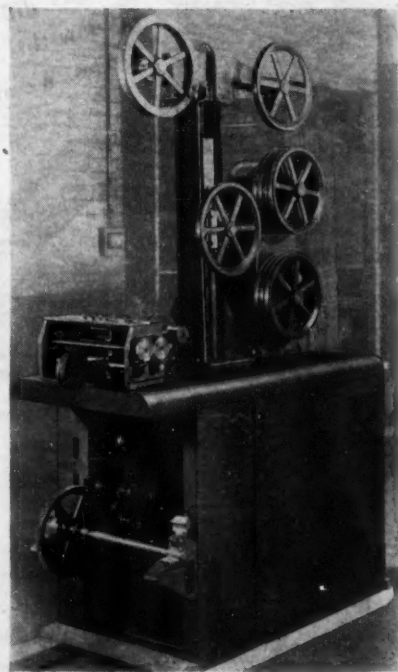
Self-contained, the new 200 "Bumblebee" has two ranges of current, the low, from 30 to 110 amperes, and the high, from 90 to 275 amperes. Continuous stepless current control is provided throughout each current range by simply turning the crank on the top of the machine. A full-view scale makes current settings easy to read at all times. The machine is entirely self-contained and all windings are covered with the latest spun-glass fibre, heat-resistant Class B non-inflammable insulation.

### Wind-up Machine QC 638

A new heavy-duty wind-up machine for the constant-speed, constant-tension winding of large diameter wire, cable, cords, rope, hose and other continuous materials, has been developed by the Industrial Oven Engineering Co.

The new machine is a larger and improved model of the constant-tension wind-up machine developed several years ago by this firm. It will handle flexible materials, such as cables, in diameters up to 1½ inches.

This machine, the only one of its kind built in America, is a complete, self-contained unit designed to maintain constant



speed and tension within a variable production range. Standard speed ranges are 25 to 150, 40 to 200 and 60 to 240 feet per minute and its tension values are from 5 to 1000 pounds. It is motor driven and requires no outside source of power or synchronization.

Built originally to draw wire and cable through an automatic saturating and lacquering system, the machine is supplied either as part of such a system or as an individual unit. The standard unit with sheaves such as those in the accompanying illustration is used for constant-



tension constant-speed single reel take-up of large diameter cable after extrusion jacketing, braid saturation, and cable stranding or bunching.

The standard model of the large machine employs a 42-inch reel, but a special size to take a 60-inch reel can be supplied. Special units can be equipped with jack type casters for mobility. The horsepower input varies with the speed and tension which are attained.

### Resistance Bridge QC 639

A resistance limit bridge working to  $\pm 0.1\%$  is now offered by Industrial Instruments, Inc. This modified Wheatstone bridge, model LB-3, has high and low limit dials covering a range of  $\pm 11\%$  in 0.1% steps, utilizing a built-in galvanometer to provide for high and low indication. In the normal operating position the zero on the galvanometer scale acts as a reference point. Relays incorporated in the instrument provide for speedy test operation, either from a switch



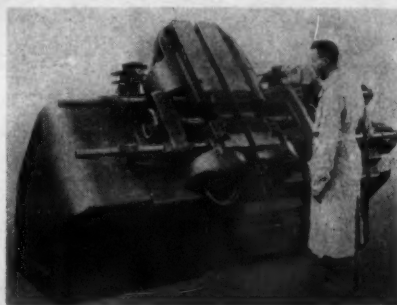
on the panel or one built into the test fixture. A receptacle on the panel provides connections between the external switch and internal relays.

This bridge may be used to check resistors between 1 ohm and 3 megohms by use of external resistance standards corresponding to the nominal values of the resistors under test. For most measurements the galvanometer and internal 3 volts D.C. source will be found satisfactory. For measurement of resistors above several thousand ohms and particularly when the resistance range is increased above 1 megohm, an external battery is recommended. For low resistance measurements particularly below 10 ohms, a more sensitive external galvanometer may be desirable, although most measurements between 1 and 10 ohms may be made satisfactorily by using an external 1.5 volt battery.

### Welding Machines QC 640

Development of a new line of butt-flash welding machines in five standard sizes embodying numerous new design and operating features to provide maximum

flexibility as to application, ease of maintenance and operation, safety and reliability—has been announced by Progressive Welder Co. The five basic sizes, ranging from capacities of 20 KVA to 250 KVA,



are classified and rated according to recommended specifications of the Resistance Welder Manufacturers Association.

The design of these machines permits them to be furnished for hand, air, hydraulic or motor operation, as desired. Also, work clamping fixtures can be operated by one method and platen traverse by the same or another method. Thus, work clamping can be air operated and the flash and upset can be hydraulically operated on the same machine without change in the basic design of the machine. According to the nature of the work to be done, the machine may be manually controlled, semi-automatic or fully automatic.

### Double-Beam Cathode Ray Tube QC 641

The double-beam cathode-ray tube, type 5SP, of the Allen B. Du Mont Laboratories, Inc., provides two complete "guns" in a single glass envelope, both aimed at or converging on the single screen for simultaneous and superimposed traces.

Heretofore the simultaneous comparison of two phenomena could be accomplished either by using two separate tubes or oscillographs placed side by side, or by using an electronic switch in order to present first one phenomenon and then the other on the same tube screen in rapid

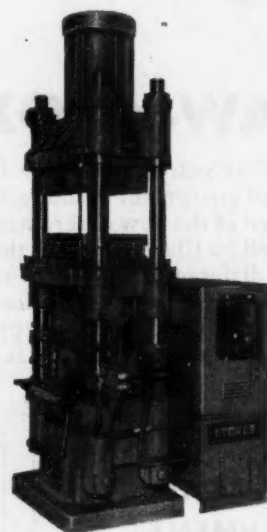


succession. However, the former method is obviously unwieldy and does not permit the superimposing of traces for accurate comparison, while the latter has limitations caused by the frequency response and the switching rate of the electronic switch, as well as the inability to use independent time bases or sweeps. The new tube removes these limitations.

The two independent "guns" are contained in a 5-inch envelope and there is complete and independent control of the X, Y and Z axis functions for each beam. Adequate shielding between "guns" and "plates" minimizes "cross-talk," particularly at high frequencies. Deflection plate leads are brought out through the glass envelope wall, minimizing shunt-input deflection-plate capacitance and lead inductance, and also preventing interaction between signals caused by coupling between long leads. Second-anode leads are also brought out through the envelope wall in order to provide better insulation and longer leakage paths. A standard Army-Navy diheptal 12-pin base fits the standard socket. The electrode voltage ratings are similar to those of the Army-Navy preferred Type 5CP1. Contact connectors for electrode leads are supplied with the tube.

### Compression Press QC 642 For Transfer Molding

The F. J. Stokes Machine Co. has announced a new combination press, for either compression or transfer molding. By using a single pumping unit, for applying pressure in compression molding



and to lock the mold shut and supply hydraulic pressure to the transfer ram, it is stated that a highly-efficient, readily-converted, dual-purpose press can be made available at a cost only a little greater than that for a compression press only.

The new press is an adaptation of the Stokes-Standard semi-automatic compression press. The transfer cylinder is mounted on the head of the press and operation of the ram is controlled by a sequence valve. The power unit has greater capacity than in the usual compression press, to provide the high mold closing speed and the high ram speed to work most efficiently with induction or electronically-heated preforms in transfer molding. For compression molding the transfer cylinder is readily cut out simply by closing a valve and the press is ready for use in the conventional manner.

# CORRECT PACKING AND SHIPPING PROTECTION WILL GO A LONG WAY TOWARD DETERMINING BUSINESS PROFITS

Many nationally-famous products are Signode Steel strapped in their safe journey to market. In most instances an effective and economical pack, designed to meet specific protection requirements, has been developed through field engineering study. Research laboratory tests often reveal the correct type of container and the right way to strap it.

This Signode service is available to any manufacturer interested in perfecting his present shipping procedure . . . or one who may now be considering the merchandising of a new item.

Pictured are a few Signode protected containers and products. They illustrate the versatility of Signode proven methods.

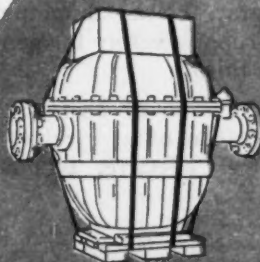
## SIGNODE STEEL STRAPPING COMPANY

General Offices: 2662 N. Western Ave., Chicago 47, Illinois

Branches: { 395 Furman St., Brooklyn 2, N. Y.  
481 Bryant St., San Francisco 7, Calif.



Illustrated Catalog showing Signode applications on many products. Your copy mailed on request.



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**SIGNODE**  
STEEL STRAPPING CO.

HEADQUARTERS FOR STEEL STRAPPING

Several methods of loading are available. In one, a loading space is provided in the upper bolster. The mold having been closed, either the preform or powder is loaded into this space and pressure is automatically applied through the transfer plunger after the operator trips a safety control lever. The plunger moves rapidly in the clear and then builds up pressure at a lower speed as resistance develops.

Advantages of this type of press for transfer molding are rapid, positive toggle action for closing and locking mold shut; elimination of the usual pot with heavy sprue and waste; low hydraulic pressure and consequent low maintenance cost; completely self-contained press with only one pumping unit; no floating platen necessary; low initial cost. By simply closing a control valve the machine becomes a straight compression press, automatic except for loading and unloading.

Specifications: Capacity 150 tons, transfer cylinder pressure 30 tons, maximum

opening between platens (lower platen up) 26", platen area 26" x 23", motor 5 hp., height 111", floor space 41" x 52".

### Hot Water Meter QC 642

Widely used for metering water at ordinary temperatures, Builders-Providence Propeloflo meter is now available for metering hot water up to 250° F. A special high temperature grease is employed for efficient lubrication and the venturi design and all other special features of this streamline propeller-type meter are retained.

### Relief Valve QC 643

M. L. Bayard & Co. announces a new atmospheric relief valve for the protection of a turbine against exhaust end damage if the unit should go over to high pressure.

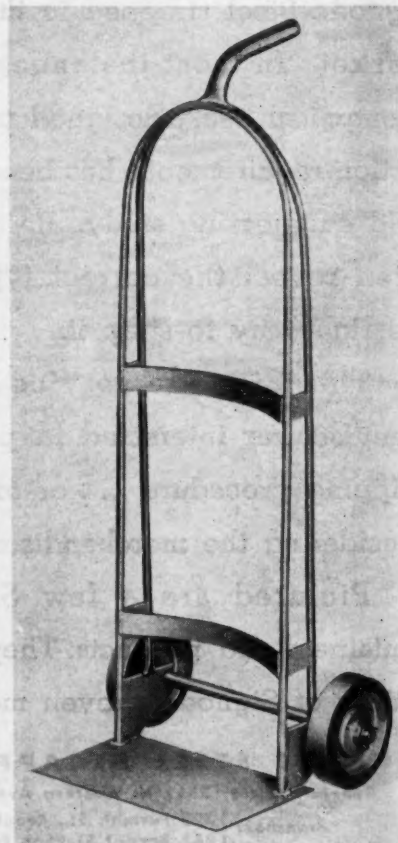
The valve is light and compact, and requires no access structure, stem, packing gland or water seal. It is so designed that upon reversal of pressure a very thin lead disc or diaphragm is sheared me-

chanically by swinging gates. This shearing is accomplished well below the allowable turbine exhaust end pressure. Replacement of the diaphragm is relatively simple after the valve has been used.

The valve is available in sizes from 6" to 42" capable of releasing 10,000 to 550,000 lbs. of steam per hour and is of all-welded construction.

### Hand Truck QC 644

A new lightweight hand truck has been announced by Yarco Distributors. The truck has a double tubular frame with "full-deep" welded joints and carries loads up to 500 pounds with ease. The large size (8" x 13") high tensile steel

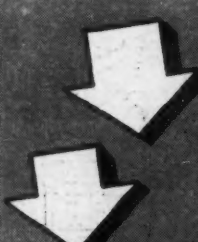


bottom plate permits safe, quick loading. The wheels are sturdy, copper-brazed, double-disc, pressed steel type with an exclusive "floating steel ball" lubrication feature for easy rolling and long life. Floor saving hard rubber treads are permanently vulcanized to the rim which is "V"-shaped to give perfect wheel alignment. It is available in a choice of colored paint finishes.

### Dry Ice Liquefier QC 645

A new dry ice liquefier, which transforms solid carbon dioxide into the liquid form, has been developed by The Mathieson Alkali Works to assist bottlers of carbonated beverages, users of carbon dioxide fire extinguishers, and other carbon dioxide consumers.

Known as the "Jumbo," the Mathieson liquefier consists essentially of a tank,



## ONLY TYGON PAINT CAN OFFER YOU THESE 2 BIG ADVANTAGES


**1.** Tygon Paint is resistant to virtually all acids, alkalies, alcohols, oils, fresh or salt water. No other paint shows such "universal" resistance to corrosive attack.

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**up to 3500°**



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October, 1945

## BROKEN OVERHEAD GASOLINE LINE FIRE KNOCKED OUT IN SIXTY-FIVE SECONDS



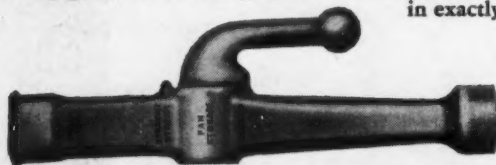
### NEW DUAL-STREAM NOZZLE

*Further increases  
fire-fighting effectiveness of*

## DUGAS EXTINGUISHERS

Pictured above is a rigorous test conducted at the DUGAS Division Test Grounds, under observation of Underwriters' Laboratories and Factory Mutual Laboratories. Burning gasoline escaped at the rate of 10 gallons per minute under 50-lb. pressure through three hacksaw cuts in a pipe 13 feet above ground.

Inset shows how quickly the fire was knocked out by DUGAS Dry Chemical after it had been allowed to burn for one full minute. Using the straight stream from the new dual-stream nozzle on a No. 350-A DUGAS Wheeled Extinguisher, the overhead gasoline fire, including blaze on ground, was extinguished in exactly 65 seconds.



deals effectively with spill fires and fires difficult to reach because of height or obstructions. Designed for use with DUGAS Wheeled Extinguishers, the new dual-stream

### NEW DUAL-STREAM NOZZLE...

nozzle greatly increases fire-fighting range and effectiveness. A turn of the handle gives a straight stream with a range of 45 feet—or a fan stream with a range of 15 feet.

#### Quick Facts About DUGAS Dry Chemical

- 1—For extra-hazardous fires involving flammable gases, liquids, greases or electrical equipment.
- 2—Not an electrical conductor.
- 3—Non-toxic, non-corrosive, non-abrasive.
- 4—Not affected by extreme cold or heat.

Write today for complete information regarding DUGAS Wheeled Extinguishers with the New Dual-Stream Nozzle... and DUGAS Hand Extinguishers.



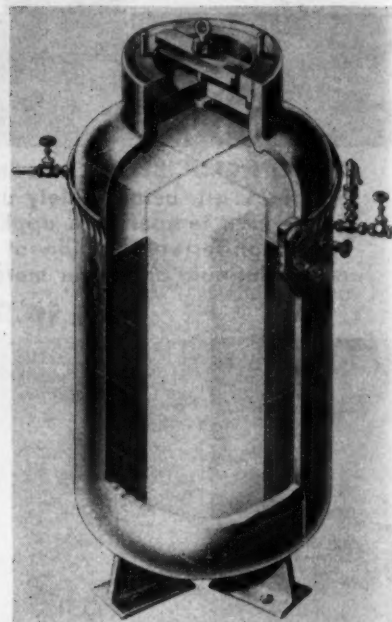
*Approved by Underwriters' Laboratories,  
and Factory Mutual Laboratories.*



**ANSUL CHEMICAL COMPANY, MARINETTE, WISCONSIN**  
DUGAS DIVISION

6'8" high and 34" in diameter, welded throughout. It has a capacity of 20 full-sized blocks, or 1,000 pounds of dry ice, five times greater than that of any other high-pressure liquefier. It is claimed that the use of uncrushed blocks of dry ice saves labor and reduces evaporation loss.

The liquefier, which is equipped with safety pressure relief devices, is engi-



neered according to A.S.M.E. specifications and carries the stamped approval of the Hartford Steam Boiler Inspection and Insurance Co.

To charge the liquefier, the blocks of dry ice are dropped through the 15-inch circular opening at the top. It is then closed, water is run down the outside surface from a perforated ring near the top, and the liquefier is ready for operation.

### Bimetallic Dial Thermometer QC 646

The new bimetallic dial thermometer of Equipose Controls is said to feature permanently-calibrated precision bimetallic helical coil measuring element having case of alloy steel in most sizes, 18-8 stainless steel connection nut and stem; large, easy-reading numerals and temperature graduations on metal dial.

Expansion of the bimetallic coil rotates the attached small shaft and indicating pointer as one unit over the entire scale as the only moving part. There are no pivots, mechanical linkages or gears. Various standard ranges are available between limits of -90° F. and 1000° F. Test or laboratory thermometers are graduated in both centigrade and fahrenheit on the same scale. Temperature can be increased 50% or more beyond end of scale range without damage to thermometer for ranges up to 500° F. with a 10% over-range for ranges up to 1000° F. Thermometers are obtainable in 2", 3" and 6" dial sizes and are installed by connecting 1/2" standard con-

# NEW CHEMICALS FROM DU PONT

## FURAN TETRAHYDROFURAN 1,4-DICHLOROBUTANE

### FURAN

#### PHYSICAL PROPERTIES

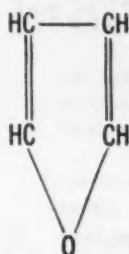
Molecular Weight ..... 68.03

Boiling Point 32.1°C. at 760 mm.

Sp. G.  $\frac{20^{\circ}\text{C.}}{4^{\circ}\text{C.}}$  ..... 0.937

Flash Point ..... Below 32°F.

Insoluble in water; readily soluble in most organic solvents.



**FURAN** ... is a highly volatile colorless liquid. It should be of great value as an intermediate in organic syntheses. With its conjugated unsaturation, furan has reaction characteristics somewhat similar to those of divinyl ether and of butadiene, but modified by its cyclic structure. Because of this modification, substitution or addition reactions can be effected depending on conditions employed. It can be chlorinated, oxidized, hydrogenated, nitrated, metallated, condensed with certain unsaturated compounds and reacted with hydrogen sulfide, ammonia, amines and mercaptans.

### TETRAHYDROFURAN

#### PHYSICAL PROPERTIES

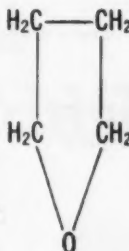
Molecular Weight ..... 72.06

Boiling Point 66°C. at 760 mm.

Sp. G.  $\frac{20^{\circ}\text{C.}}{4^{\circ}\text{C.}}$  ..... 0.888

Flash Point ..... Below 80°F.

Very soluble in water and in most common organic solvents.



### TETRAHYDROFURAN OR TETRAMETHYLENE OXIDE ...

is a colorless liquid with a strong ether-like odor. It possesses outstanding solvent properties, dissolving many types of resins, both natural and synthetic.

Chemical reactions of this compound are those of an aliphatic ether modified by its cyclic nature. Among these reactions are dehydration to butadiene, oxidation to maleic acid, conversion to halohydrins or dihalides, and reaction with ammonia to form pyrrolidine or with hydrogen sulphide to yield tetrahydrothiophene. Reaction with primary alkyl and aryl amines yields N-alkyl and N-aryl substituted pyrrolidines. Tetrahydrofuran can also be chlorinated, yielding compounds of interest as intermediates in synthesizing other materials.

### 1,4-DICHLOROBUTANE



#### PHYSICAL PROPERTIES

Molecular Weight ..... 126.96

Boiling Point ..... 155°C. at 760 mm.

Sp. G.  $\frac{20^{\circ}\text{C.}}{4^{\circ}\text{C.}}$  ..... 1.141

Flash Point ..... 140°F.

### 1,4-DICHLOROBUTANE (Tetramethylene Chloride) ...

is a colorless mobile liquid with a pleasant odor. The chlorine atoms of this compound are highly reactive, and one or both may be replaced by sulphur, cyanogen, amine, alkoxy, aryloxy and other groups. Its diversity of reactions should make it an exceptionally valuable intermediate in organic syntheses.

**AVAILABILITY...** Limited quantities of these products are available for research and development. A request on your company letterhead will bring further technical information and also a sample if desired. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Field Research Section, Wilmington 98, Delaware.

## DU PONT ELECTROCHEMICALS FIELD RESEARCH SECTION



BETTER THINGS FOR BETTER LIVING  
...THROUGH CHEMISTRY

# PACKAGING & SHIPPING

by T. PAT CALLAHAN

## Postwar Packaging is Here

**S**TEEL DRUMS, fibre drums, multi-wall paper bags, and corrugated and solid fibre boxes are used in some form by practically the entire chemical industry. With the ending of the war, it is only natural that shippers using these containers should immediately survey their continued use and ask themselves questions about what is to be expected from these containers as soon as they become available and all restrictions are lifted.



T. Pat Callahan

We have noted a few facts concerning these packages and list them as a sort of guide as to what might be expected from the use of these containers.

Adoption of any container will be affected by its ability economically and safely to transport a particular chemical; and for the containers above listed we feel that the user should determine what is best fitted to his particular need.

Investigation and study will pay dividends in economy and satisfactory containers; and with this thought in mind, we feel that it may be well to consider what is listed below for guidance in adopting the particular container needed.

**Steel Drums:** Standardization of sizes between 5 gallons and 55 gallons, eliminating all in-between sizes wherever possible.

Determination of proper openings and closures to be used. Particularly is this important on full open head drums for liquid products.

Use of returnable drums for economy may be effected. If lighter gauge metal is used, and drum becomes non-returnable, this will eliminate return freight, increased cost of handling, and accounting work necessary to keep proper records.

Various coatings may be applied to steel drums, and the practicability of these must be determined.

**Fibre Drums:** Standardization wherever possible of sizes used.

Construction, whether convolutely or spirally wound, and whether all drums will meet prescribed compression tests.

Is moisture preventative necessary, and is sufficient protection afforded by the material used in construction to protect against moisture penetration?

Is the material used in the manufacture of fibre drums sufficient to eliminate loose fibres coming in contact with the product?

Can shipments in large quantities be nested one into the other in order to save freight on delivery of empty containers?

**Multiwall Paper Bags:** Determination of material to be packaged, and whether it lends itself to filling into sewn open mouth bag, or can material be safely filled and shipped in valve type bag.

For most free flowing materials, the valve type bag is the most practical and economical.

Is proper basis weight of paper being used in the construction of the bag? In many cases damages in transit to materials placed in multiwall paper bags can be attributed to lightness of construction.

Is a sheet of asphalt impregnated paper or some other moisture resistant application necessary in order to control moisture?

Have the economies of filling, handling and storing been thoroughly surveyed?—not only storage of finished product, but storage of empty bags.

Has the subject of palletized loading and storing been considered? Because of the efforts of the various government agencies in shipping multiwall paper bags, the economies of palletizing is one which must be explored thoroughly.

**Corrugated and Solid Fibre Boxes:** Use of specially treated fibreboard, commonly referred to as V-boxes, should be investigated. Tests have demonstrated the effectiveness of treated board, and particularly in the chemical industry will this development prove beneficial.

Substitution of corrugated and solid fibre boxes for heavy wooden boxes, which are much more expensive, should be investigated. This will not only effect savings in original cost of container, but will save considerable freight due to difference in weight between wood and fibre.

### Paper-Bound Box Strapping

A tough, pliable, new box strapping, bearing the name "Fiber-Steel," consists of a highly flexible steel band core sheathed in a tough kraft paper which has been waterproofed. The smooth, wax-finished, water-repellent cover is scuff-resistant and provides proper tension without excessive biting into corrugated box. Fibre-Steel strap can be applied directly to enameled or painted surfaces without danger of marring, and can be

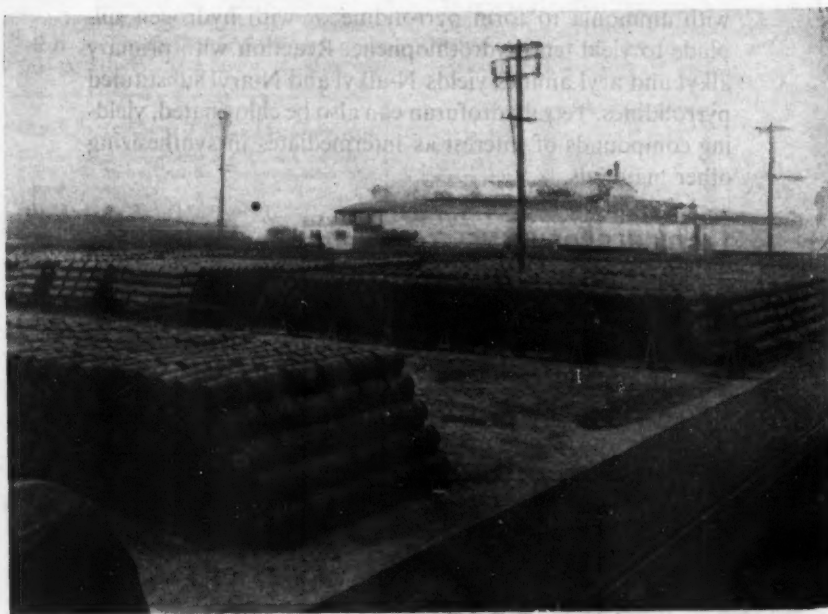


Photo courtesy Rheem Mfg. Co.

One must consider the cost of returnable vs. non-returnable drums. These 55-gallon 18-gauge drums weigh approximately 52 pounds each. Heavy returnable type drums will weigh between 75 and 110 pounds each. Reconditioning, cleaning and painting, plus freight difference going and coming must be considered.

From a St. Regis advertisement — 1939

**"The Finest Industrial Peacetime Package"**

From a St. Regis advertisement — 1942

*Essential*

*Wartime*

**"~~The Finest~~ Industrial ~~Peacetime~~ Package"**

**AND NOW: 1945**

*Improved*

*Peacetime*

**~~Essential~~**

**~~Wartime~~**

**~~The Finest~~ Industrial ~~Peacetime~~ Package**

**D**URING the past few years, the St. Regis Paper Company has geared its bag production to serve wartime needs.

To this end, a new bag plant was erected in Kansas City. Substantial additions were made to our other bag plants throughout the country.

The company's laboratories and testing facilities developed new grades of paper and improved bag construction to cope with the hazards of wartime shipping and storage.

Today, as industry returns to a free, peace-time economy, St. Regis augmented production facilities and the technical developments of recent years are available to American industry for the packaging of many

types of food, as well as construction, agricultural, and chemical commodities.

We are confident that St. Regis packing machines together with improved Multiwall valve and open-mouth paper bags will keep pace with the increased tempo that will characterize American progress in the years that lie before us.



MULTIPLY PROTECTION • MULTIPLY SALEABILITY  
**ST. REGIS PAPER COMPANY**  
TAGBANT CORPORATION

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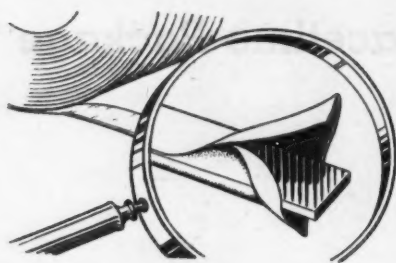
Seattle, Wash.

Nazareth, Pa.

Toledo, Ohio

October, 1945

handled by girl operators without danger of cut fingers. Because of its paper covering, trade-marks and company names can be printed directly on it. Full



information on the new strapping may be obtained by writing A. J. Gerrard & Co., 221 North LaSalle Street, Chicago 1, Ill.

### Fibre Drum 21A

During the past year we have discussed the specification containers approved by the Interstate Commerce Commission for use in the packing of various chemicals. We have covered carboys, drums, cylinders, barrels, fibre boxes, etc. In this issue, we would like to discuss a specification container very important to the chemical industry and one which is being used extensively for the shipment of hazardous chemicals as well as for the shipment of many other products which are classified as dangerous. This specification is ICC21A Fibre Drums.

While fibre drums are made in various sizes from one gallon to seventy-five gallons, the use of the fibre drum for dangerous articles is restricted to an authorized net weight of not over 200 pounds. However, for certain products subject to certain tests, the Interstate Commerce Commission permits their use up to 375 pounds gross weight. We quote specification ICC21A in full and will elaborate not only on the specification container and its uses but the fibre drum in general.

### Specification 21A Fibre Drums

#### General

1. Compliance:—Required in all details.

#### Construction

2<sup>1</sup>. Parts and dimensions (minimum):—As follows:

<sup>1</sup> Amended, effective Feb. 1, 1943.

Author- ized Net Weight (Pound)	Side Wall Calculated <sup>4</sup> Strength <sup>5</sup>	Wooden Heads <sup>6</sup> 7	Fibre Heads <sup>6</sup> 7			Max. Gal. Cap.	Max. Inside Dia.
		Thickness (Inch)	Thickness (Inch)	Strength <sup>8</sup>			
56	680	$\frac{13}{16}$	0.120	590	7½	9"	
56	680	$\frac{13}{16}$	0.120	650	15	14"	
56	680	$\frac{13}{16}$	0.170	800	20	18½"	
115	850	$\frac{13}{16}$	0.170	800	30	18½"	
115	850	$\frac{13}{16}$	0.220	900	45	23"	
200	1100	$\frac{13}{16}$	0.220	900	55	18½"	
200	1100	$\frac{13}{16}$	0.260	1000	55	23"	

<sup>3</sup> Mullen or Cady test.

<sup>4</sup> Number of laminations times strength of sheet. For walls made with liner, include liner in calculations.

<sup>5</sup> When made of 2 or more discs, the discs must be fastened together with adhesive.

<sup>6</sup> Approved metal heads permitted when authorized (see paragraph 5).

<sup>7</sup> Joints in head must be Linderman joints, glued. A butt-jointed, glued wooden head is

also authorized because of the present emergency and until further order of the Commission.

3. Side walls:—To be solid or consist of outer shell with liner; each piece to be made of a continuous fibre sheet, convolutely wound, at least 0.01" thick, the plies being secured together by adhesive.

4. Type tests:—Samples taken at random, filled with dry, finely powdered material to authorized net weight, closed as for use, must withstand tests, under supervision of a representative of the Bureau of Explosives, without leakage or serious rupture as follows:

(a) Drum must be able to withstand a drop from height of 4 feet on a solid concrete floor, so as to strike diagonally on it (1) top chime, (2) drum closure, (3) end, or any other weak point. Drums with wood heads to be dropped with grain of wood in cover parallel to concrete surface. No single drum shall be expected to withstand more than one drop.

(b) Compression test by applying weight or pressure not less than 1,000 pounds on the top (cover) of drum.

(c) The tests described above must be made by any company starting production on samples taken at random of each type and size of container and must be repeated every 4 months or less during production; samples last tested must be retained until further tests are made.

#### Registration of Drum Specification

5. Specification for each type of drum manufactured (under this specification) shall be filed

with the Bureau of Explosives. Changes in construction (drum and closure) differing from specification thus filed must be approved by the Bureau of Explosives before authorized for use.

#### Marking

6. On each container:—As follows:  
(a) I C C—\*\*\*; stars to be replaced by specification number under which container was made, followed by the authorized gross weight

## A Message from CONSOLIDATED

Priceless—our Victory and long awaited Peace—priceless too, the good will, the patience and the understanding of so many of our customers. Some have waited since 1942 for Capem, for Hoepner, Sealtite and other outstanding Consolidated machines.

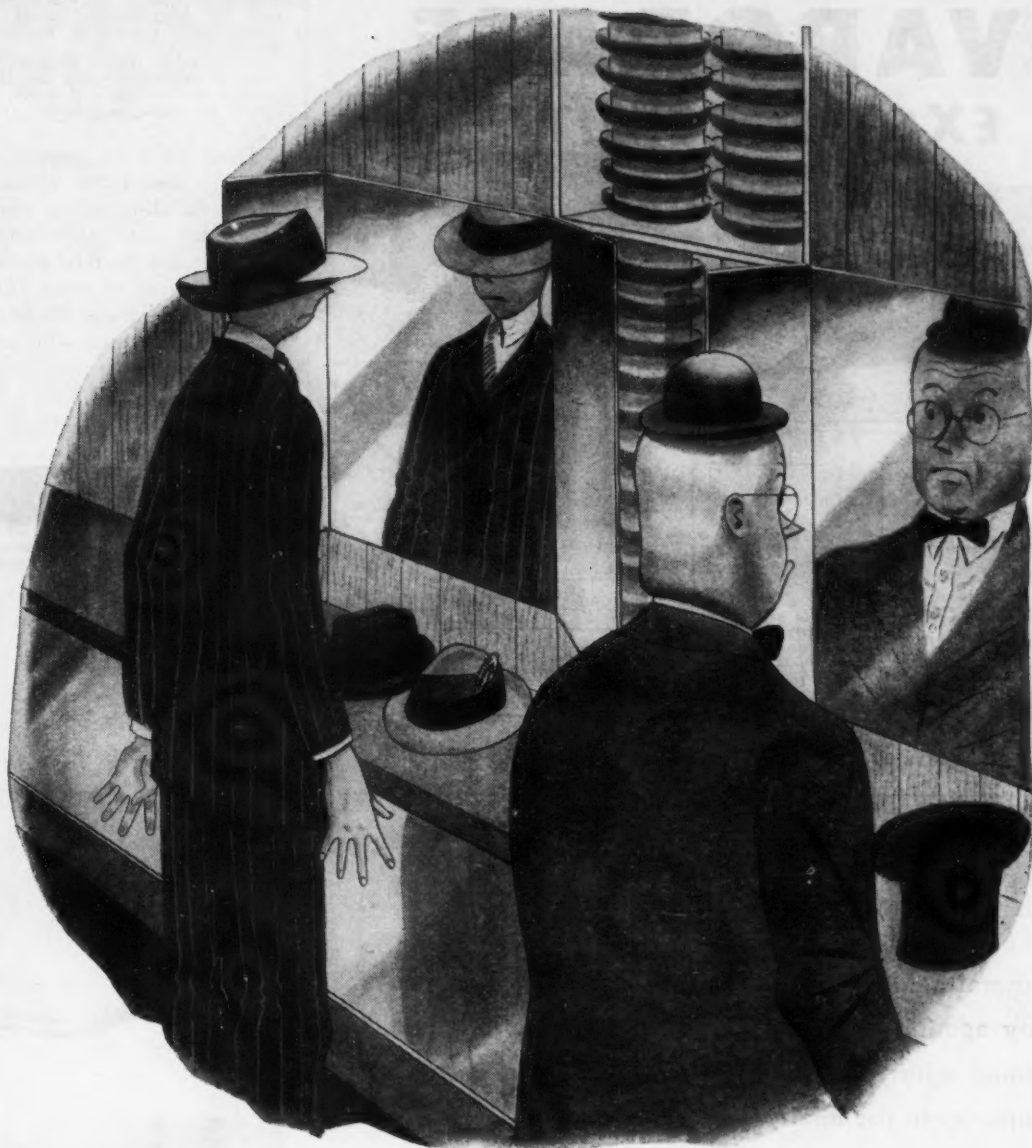
We are not unmindful of our deep obligation to you and others whose confidence in this company and its products has been so evident. We are grateful, indeed, for Victory and for the privilege of again serving your accumulated needs. Humbly we pledge not only our own utmost effort, but every available facility we can practically employ to meet our important responsibilities.

**CONSOLIDATED PACKAGING MACHINERY CORP.**  
**BUFFALO 13, N. Y.**

**CAPEM**

**SEALTITE**

**HOEPNER**



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**O**F all people, it shouldn't happen to canners. That's why we take such pains to see that every item in the manufacture of Crown cans is just right for your most efficient operation.

When you use Crown cans, you are sure of getting the correct type of plate . . . the proper coating for your particular job. You likewise know that the end seams have been given

a liberal flow of compound . . . that there are neither cracks nor perforations in the ends. And since proper sealing of the ends calls for precisely functioning closing machines, we assure you Crown's equipment for this purpose is the finest made.

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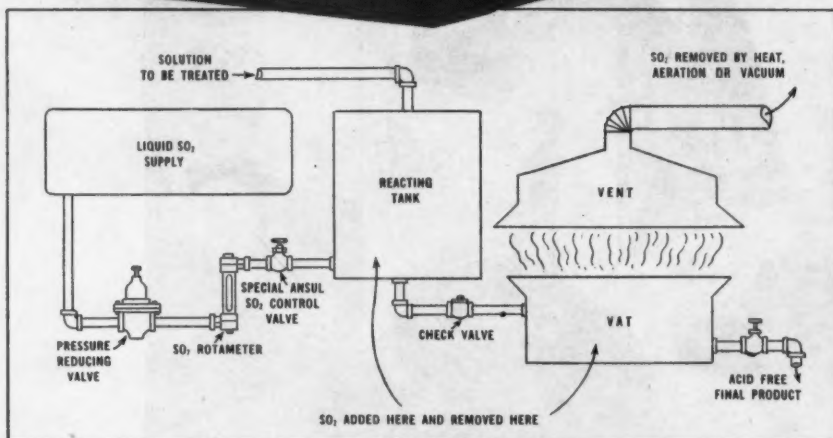
CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • Division of Crown Cork and Seal Company, Baltimore, Maryland

October, 1945

679

# EVAPORATE EXCESS ACIDITY

Use **ANSUL SO<sub>2</sub>**  
as an acidifying agent and remove  
excess by heat, aeration or vacuum



Here is a typical SO<sub>2</sub> acidifying and precipitating system showing how the SO<sub>2</sub> is introduced and excess acidity removed.

- Ansul SO<sub>2</sub>, a volatile acid, provides distinct advantages over mineral acids when used as an acidifying and precipitating agent. 1—Excess acidity is easily eliminated. 2—Residual acidity that might otherwise be concentrated as an impurity in the final product is minimized.

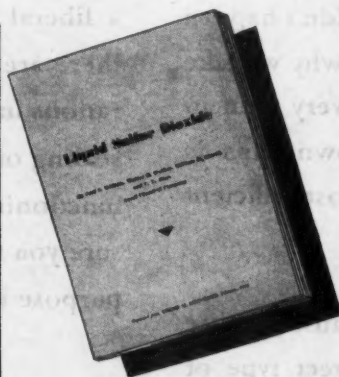
Ansul Liquid SO<sub>2</sub> is pure, inexpensive—easy to handle. It has unusual bleaching and preservative qualities and its use results in products of greater purity.



## PHYSICAL PROPERTIES

Chemical formula.....	SO <sub>2</sub>
Molecular weight.....	64.06
Color (gas and liquid).....	Colorless
Odor.....	Characteristic, pungent
Melting point.....	-103.9° F. (-75.5° C.)
Boiling point.....	14.0° F. (-10.0° C.)
Density of liquid at 80° F. ....	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F. ....	1.363
Density of gas at 0° C. and 760 mm.....	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature.....	314.82° F. (157.12° C.)
Critical pressure.....	1141.5 lbs. per sq. in. abs.
Solubility.....	Soluble in water
Purity.....	99.9+% (by wt.) SO <sub>2</sub> (H <sub>2</sub> O less than 0.01%)

\*REG. U. S. PAT. OFF.



Send for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff.

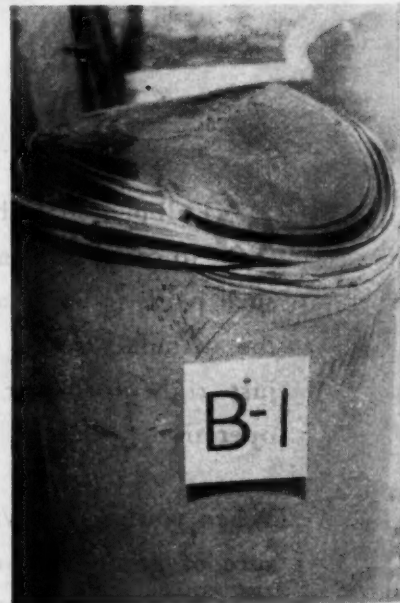
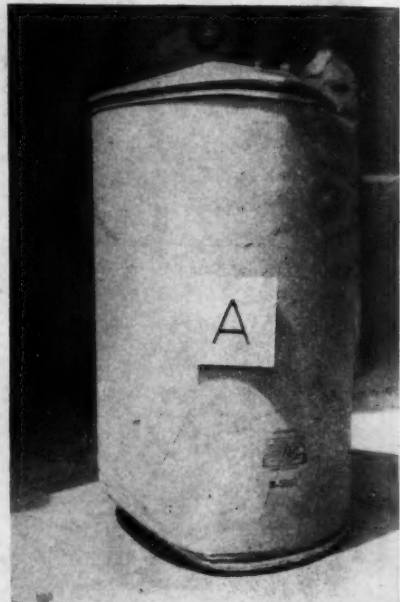
**ANSUL CHEMICAL COMPANY, MARINETTE, WIS.**

Eastern Office: 60 E. 42nd St. New York City

(authorized net weight plus approximate tare weight, for example, ICC-21A130). This mark shall be understood to certify that the container complies with all specification requirements.

(b) Name or symbol (letters) of maker; this must be registered with the Bureau of Explosives and located just above, below, or following the mark specified in (a).

There are three types of fibre drums generally used in the chemical industry. One is the all-fibre drum; another is the fibre drum with either one or two ends of metal; and the third is the fibre drum with both ends of wood. Each of these different fibre drums has its own particular use in the chemical industry and will play an important role in the postwar development of containers for a great many dry and powdered materials.



These drums are used to ship Class "B" poisonous solids. The upper one was dropped on both chimes from 4 feet, the lower one on the top chime from 7½ feet, without incurring leakage.

# TAKE YOUR "BABY" TO THE DOCTOR!

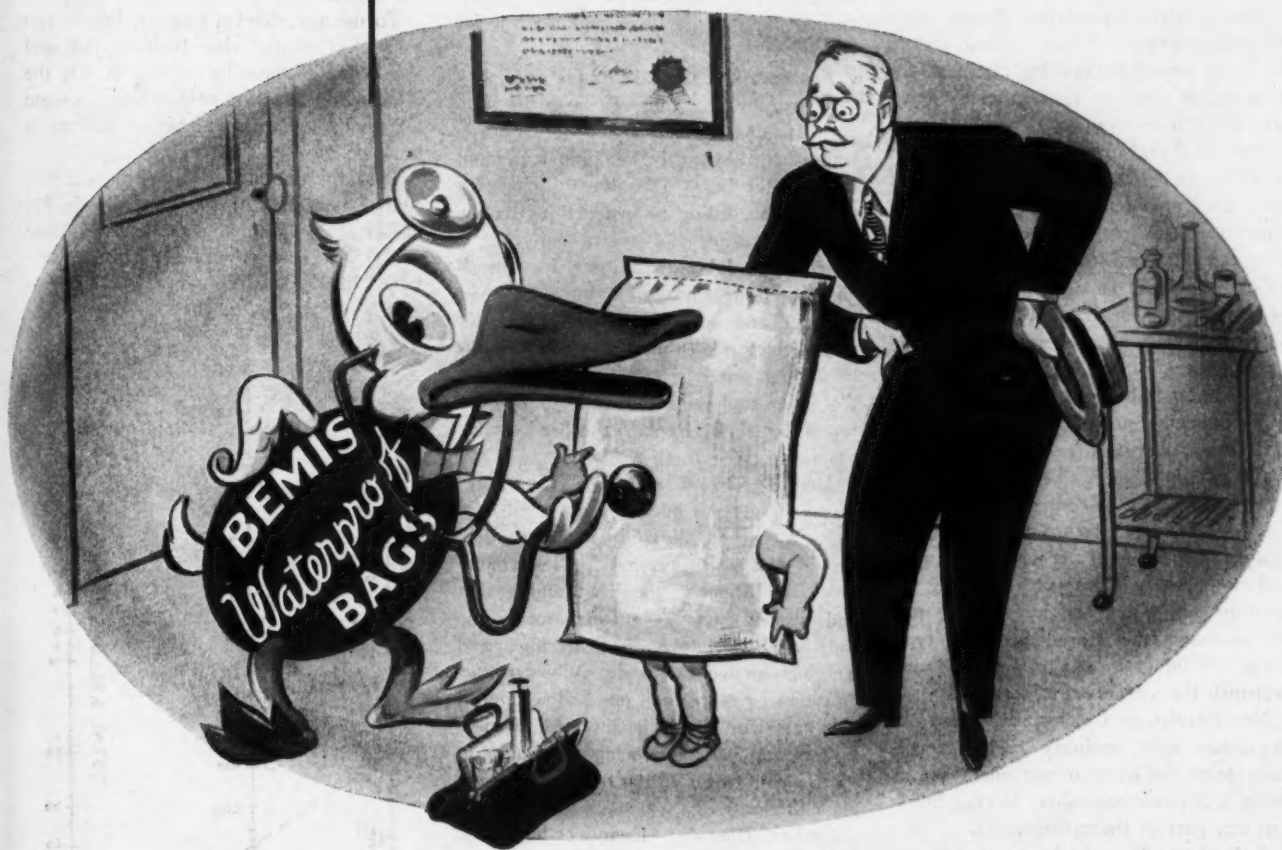
Here is an export package that can give your new product full protection for either domestic or overseas shipment, and at low cost! It's the tear-resistant, puncture-resistant Bemis Waterproof Bag selected for your new "baby" by the Bemis "doctors."

These trained packaging specialists in the Bemis Shipping Research Laboratory eliminate guesswork in protective packaging. They study your product, analyze the conditions under which it will be handled, and then determine what materials and type of bag construction will give

you just the protection you require.

Finally, they test the bag selected under extremes of shipping and storage conditions. When it receives a final "O.K." by the Bemis Shipping Research Laboratory, you can be sure your "baby" will travel safely.

Mail the coupon below today! It will bring you an informative booklet, "A Guide to More Efficient Shipping." If you desire, a Bemis representative will call to show you how this export package can prove equally efficient for either domestic or overseas shipment. There is no obligation.



## Here's Why Bemis Waterproof Bags are Sturdy, Efficient



1. Inside layer of flexible creped kraft paper impregnated with a...
2. Layer of waterproof adhesive that also seals the pores in the...
3. Outside layer of burlap or cotton and cements both layers together.

WATERPROOF DEPARTMENT

### BEMIS BRO. BAG CO.

St. Louis • Brooklyn

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407 Poplar St., St. Louis 2, Mo.;  
5122 Second Ave., Brooklyn 32, N. Y.

Please send your special booklet, "A Guide to More Efficient Shipping," and details about use of Bemis Waterproof Bags for \_\_\_\_\_

(PRODUCT)

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Company \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

# PLANT OPERATIONS NOTEBOOK

## Servicing of Fire Extinguishers

Hand fire extinguishers must be kept ready for instant use. To maintain them in good working order, they must be inspected frequently, refilled immediately after use, and thoroughly serviced at least once a year.

The annual servicing may be carried on throughout the year by a few experienced men, who also take care of recharging. If a large number of extinguishers is involved, the work can be done at one time by a group especially assigned to this duty. Inexperienced men should be supervised to assure correct treatment and reassembly of each extinguisher. In no case should so many extinguishers be removed for servicing at the same time as to leave any area without protection.

Soda acid and foam extinguishers must be recharged annually, if they have not been used and refilled in the meantime. Other types are recharged only after use. The tag attached to each extinguisher should show the last date of recharging or annual servicing. Only replacement parts or recharging materials made by the manufacturer of the extinguisher being serviced should be used.

The servicing procedure for each type is as follows:

**Vaporizing Liquid:** Test the action by pumping some of the contents into a clean, dry container, and return the discharged liquid. In the case of the pump-gun types, add more liquid, if necessary, to bring the level to within half an inch of the top. In servicing the stored pressure type, bring the liquid to the proper level and replenish the air pressure.

Never recharge a vaporizing liquid extinguisher with ordinary carbon tetrachloride or use water to test operation, as either will cause corrosion. Do not lubricate any part of the extinguisher.

**Soda Acid:** Be sure the nozzle opening is clear; then invert the extinguisher and discharge the contents. Unscrew the head and examine the gasket, which should be replaced if it is damaged or badly worn. Remove the cage containing the acid bottle, putting aside the stopple for later replacement. Make sure all the extinguisher parts are kept together so that they may later be returned to their respective units.

Rinse the extinguisher shell thoroughly with warm water, draining it through the hose. Open clogged holes in the hose strainer with a piece of wire. Replace the hose and nozzle, if badly worn or damaged.

Dissolve the dry chemical in lukewarm water, according to directions on the re-

charge package. Pour the solution into the extinguisher shell, and bring to the filling mark by adding water. Remove the cork from the new acid bottle and replace it with the stopple from the old bottle. Replace bottle and cage in the extinguisher neck. (If any acid spills on the skin or clothing, wash it off with water.) Rub a little vaseline on the shell threads and replace the head, using only hand power. Be sure that the gasket fits snugly against the shell neck.

**CAUTION:** If the extinguisher looks badly dented, or the seams appear weakened, do not discharge. Instead, remove the head and pour out the contents. Return to the manufacturer or his agent for repair.

**Foam:** As in the case of the soda acid, discharge by inverting. Remove the head and lift out the inner tank. Rinse the extinguisher thoroughly, draining water out through the hose. Dissolve the charging material according to instructions on the packages, using hot water for the A charge and lukewarm water for the B charge. Pour solution A into the inner cylinder and solution B into the outer tank, bringing both up to the filling marks by adding water. Replace the stopple on the inner tank and return it to the extinguisher shell. Replace the head, as for the soda acid.

**Loaded Stream and Gas Cartridge:** Since these types operate by gas released from a carbon dioxide cartridge, they should not be discharged for the annual servicing. Remove the head and gasket and inspect parts as outlined under the soda acid. Remove the cartridge and weigh on an accurate scale. A loss of half an ounce or more indicates leakage and a new cartridge should be inserted. If necessary, add water to bring the liquid in the tank up to the filling mark. Then replace the head.

**Carbon Dioxide:** Examine hose and horn for defects and see that the seal on the operating valve is intact. Weigh the unit. If there is a loss of weight, the extinguisher should be recharged. Recharging service is offered by the extinguisher manufacturer or his agents or by carbonic gas plants.

**Pump Tank:** Test by operating the pump several times, discharging the solution back into the extinguisher tank. A drop of thin lubricating oil may be placed on the piston rod packing. Bring up to the filling mark by adding water, if necessary.

**Dry Chemical:** The first inspection step in the case of the portable model is for the detection of loss of pressuring gas which is carried out by removal of the head ring

and weighing the cartridge of carbon dioxide. In the inspection of the wheeled model it consists of checking the pressure in the separate nitrogen cylinder. The remaining inspection steps for both models consist of a further examination by removal of the fill plug or cap for inspection of the chemical, followed by a check for removal of any obstruction in the hose or nozzle.

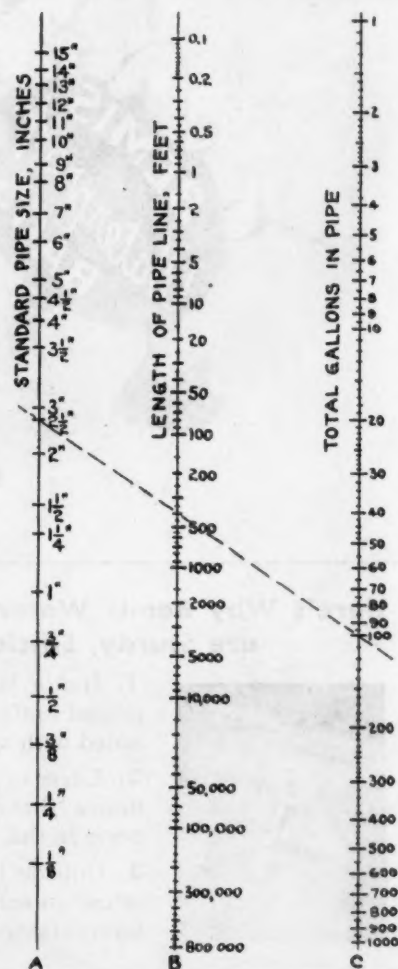
## Volume Held by Pipe Line

It is often necessary to determine the volume contained in a given length of pipe and the following nomograph has been developed to provide an answer to this question.

This chart provides for all standard pipe sizes from  $\frac{1}{8}$  inch to 15 inches in column A, and any length of pipe line from 0.1 foot to 800,000 feet in column B. Column C shows volumes from 1 to 1,000 gallons.

To use the chart a straight line is run through the pipe size (column A) and the length of pipe line (column B), the intersection with the volume line (column C) giving the total number of gallons in the pipe.

Thus the dotted line drawn across this chart shows that if the pipe size is  $2\frac{1}{2}$  inches (column A) and the length of line is 400 feet (column B) the volume contained in the pipe (column C) is 100 gallons.



# Church & Dwight Co., Inc.

Established 1846

70 PINE STREET

NEW YORK

Bicarbonate of Soda

Sal Soda

Monohydrate of Soda

Standard Quality

## GILSONITE

### SUPER SELECTS

LOW VISCOSITY TYPE • MP 275°F • EXTREMELY UNIFORM

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Refined Selects "Tailor-Made" 285-295-305°F

### ALLIED ASPHALT & MINERAL CORP.

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# LABORATORY NOTEBOOK

## Cationic Agents in Test Papers

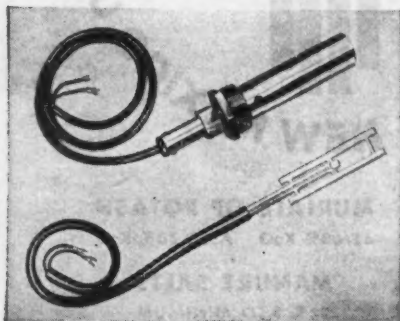
In a British journal (*Journal of the Society of Chemical Industry*, March 1945, 88) A. Steigmann describes the use of a cationic agent, trimethyl- $\beta$ -oleamidoethyl-ammonium sulfate, in spot-test papers.

The above quaternary ammonium salt forms, with such reagents as nitroso-R salt, thiocarbonyl, aluminon, and chromotropic dioxime, precipitates which are insoluble in water but easily soluble in organic solvents. It is possible to impregnate ordinary filter paper with such solutions for use in spot tests for metallic cations. These papers have the property of preventing spreading of the test spots and of producing sharp reactions. The impregnation renders the paper somewhat water-repellent and the reaction products are insoluble in water. This is particularly important where the reaction products, without the quaternary salt, diffuse badly even on special test papers such as those of nitroso-R salt with cobalt.

The paper describes in detail the preparation of several test papers.

## Conductivity Cells

A newly developed dip type electrolytic conductivity cell of high cell constant is now available in a number of models. Of heavy walled Pyrex and platinized platinum sheet construction, the CEL-H type cell is made with cell constants of 5, 10, 20, 50, and 100. Because of the unrestricted and wide bore tubing construction, response to changes in solution concentration is rapid. The glass cell was designed for laboratory use. When mounted in a stainless steel perforated guard tube provided with a 2" standard pipe thread, the CEL-HY type cells are well adapted to plant use where their high cell constants



tend to reduce polarization errors and eliminate the need for frequent platinizations.

The advantage gained in using a high-constant cell for measurements in highly

concentrated solutions of acids, alkalis and salts is shown by a single example. Using the CEL-H100, the measured resistance of a 10% Hydrochloric Acid at 130° F. would be 100 ohms. By contrast a dip cell of the usual cell constant of 1, would on immersion in the same solution show a resistance of only 1 ohm. The accurate measurement of so low an electrolytic resistance would be very difficult and would require special equipment. However, using the CEL-H100 or CEL-H100Y, the simple Solu-Bridge type of A. C. Wheatstone Bridge gives accurate and entirely satisfactory readings.

Further information can be obtained from Industrial Instruments, Inc., 17 Pollock Avenue, Jersey City 5, N. J.

## Platinum Ware

A new material, an alloy of all platinum family metals, has been developed recently. It is flexible and its outer surface reveals no scoring after numerous fusions. The ease of handling this new platinum material, trademarked "Capaloy Platinum," resists the strain of inexperienced handling that eventually causes cracks in all other types.

Capaloy Platinum is non-oxidizable, at all temperatures, for all practical purposes, due to the perfect balance of the platinum family alloys with pure platinum.

Capaloy Platinum is resistant to all acids, but it may be attacked in boiling aqua regia. Being composed of all platinum family metals, this alloy must be used with the same precautions as any platinum ware; namely not to ignite phosphates or arsenates, nor reduce easily fused metals, such as lead, etc., in contact with it.

The manufacturer is equipped to supply crucibles, dishes, wire, sheet and foil promptly.

## Determination of Cation-Active Materials

The widespread use of cation active detergent germicides has led to the development by the Emulsol Corporation of a convenient and rapid analytical method for determination of cation activity in dilute solutions.

The Emulsol Corporation has also devised a small, compact reagent kit (patent pending) for applying the new method. With very little experience an unskilled operator, by means of the new method and kit, can complete a determination in less than two minutes with sufficient accuracy for the purpose intended.

The difficulties presented by the problem are apparent from the fact that cation active agents, being highly germicidal as a rule, are ordinarily employed in dilution of 1:3000 to 1:10,000 and even lower concentrations.

While the method and kit were particularly designed for estimating concentra-



tions of Emulsept germicide, an Emulsol product, they also are applicable to certain other cation-active materials.

## Test Cabinet

A new low temperature test chamber operates automatically to facilitate tests of products which are affected by extremes of temperature, pressure and humidity at low



temperature, high altitude, and humidity conditions. Model NL-945 (A) has a temperature range of minus 100° F. to plus 200° F. The vacuum range is sea level to 80,000 ft. and humidities are 15% to 95%. The internal dimensions of the clear test space are 24" x 24" x 24". The unit is equipped with electrical test connections from the exterior to the interior and other useful accessories.

All refrigeration machines, vacuum pump, etc., are contained under the test space and are fully automatic. Model NL-845 (A) is identical with model pictured but omits vacuum and humidity features.

These machines were developed during the war for test of airborne electronic equipment and aircraft instruments, but are now available for studying food processing methods, metallurgical methods, instrument calibration, thermodynamic problems and general laboratory use. They are manufactured by Northern Laboratories, Ltd.

# U.S.I. CHEMICAL NEWS

October

★

A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries

★

1945

## New Alkyd Resin for High-Gloss Baking Enamels

### S & W Aroplaz 906 Is Especially Good for Whites

The first of a new line of postwar alkyd resins, S. & W. Aroplaz 906, is now being produced in major quantities for civilian applications, according to a recent announcement by U. S. I. Designed for use with either the ureas or melamines in bake coatings, or in nitrocellulose lacquers, particularly where extreme hardness and good cold-check resistance is desired, this new development is reported to be superior to pre-war alkyds.

Aroplaz 906 facilitates the production of finishes having maximum color retention. It is especially suitable for use in white, domestic-appliance finishes, such as refrigerator, stove and washing-machine enamels. It imparts high gloss characteristics and produces finishes of exceptional hardness and toughness. These finishes have excellent resistance to abrasion, water, alkalis, fats and oils.

Supplies of this new resin are not subject to restriction and are fully available for any application. Samples and additional data may be had on request.

#### SPECIFICATIONS

Solution (Xylol with trace of Butanol)	49-51%
Viscosity (G.H.)	P-U
Acid Number (solvent free resin)	6-10
Color (G.H. 1933)	3-5
Wt./gallon at 25° C	8.25-8.35 lbs.

## Ether, Acetone Extract Potent New Germicide

Actinomycin A, a powerful germicide found effective in dilutions as attenuated as one part in one hundred million, is particularly effective in inhibiting the growth of gram-positive bacteria.

A recent patent covers a method of extraction from a micro-organism found in soil. The method consists of extracting the culture with ethyl ether or acetone. The solvent is then evaporated, leaving a solid substance which contains Actinomycin A and Actinomycin B.

## Indalone Business to Dodge & Olcott

In view of the widespread activities of Dodge & Olcott in the field of insecticides and allied products, U.S.I. has transferred its well known product, Indalone, to this subsidiary company. Indalone is now available for civilian use and all inquiries should be addressed to Dodge & Olcott, Inc., 180 Varick Street, New York, N. Y.

## Most Resin Raw Materials Freed; New, Improved Products Appear

### Alkyd Resins Now on Market or Under Development Offer Up to 33% Better Drying Rates, Durability and Other Characteristics

With almost breath-taking speed, after Japan surrendered, WPB lifted a majority of the controls on the raw materials used in synthetic resin manufacture and paved the way for the early introduction of many new alkyd resins. These



new resins are destined to take great strides in capturing many markets that oleoresinous varnishes held, largely unchallenged, before the war. Although no revolutionary new alkyds have been developed during the war, many are available now, and more will be offered shortly, which are up to one-third better than their prewar counterparts—in speed of dry, durability, color retention, gloss retention and other performance characteristics. Equally important, many manufacturers of protective coatings and other resin-containing products have acquired new and invaluable "know-how" in the use of alkyds as a result of their government business, much of which was based on alkyd resins.

#### Varnish Resins

Most of the prewar hard resins, the conventional modified phenolics and maleics used in oleoresinous varnish cooks, have, at least temporarily, become obsolete. Newer resins have been developed which are markedly superior in speed of bodying and speed of dry, especially, as now, when soft oils like linseed must be used. When low-cost tung oil is again available in quantity, however, the prewar resins can be expected to stage a comeback, since some types are superior when used with oils like tung.

#### Oils and Rosin Still Scarce

Despite the critical situation which existed on phthalic anhydride right up until V-J day, this chemical is now freely available. The same applies to phenols, formaldehyde, maleic anhydride, aromatic solvents, etc. However, there is a world-wide shortage of vegetable oils, both drying, and non-drying, as a result of the critical need for these oils in food products. This shortage, and consequent gov-

(Continued on next page)

## Stabilizes Bath Oils

Bath-scenting oils, formulated with alcohol, tend to separate in use, the oils floating to the surface of the bath water in globules. Addition of small quantities of substituted sorbitol or mannitol compounds to the solution, according to a British source, prevents this undesired separation.

## Pyrimidines Prepared by Novel Process

Pyrimidines, particularly 2-substituted amino pyrimidine, an important intermediate in the preparation of 2-sulfanilamido pyrimidine, may be prepared in a new and better way, according to the claims made in a new patent assigned to one of the leading pharmaceutical laboratories.

Two methods are described. In the first, a guanidine salt, a beta-alkoxyacrolein acetal, absolute ethanol and hydrogen chloride are mixed under substantially anhydrous conditions. The solvent and excess acid are removed under vacuum, and the residue made strongly alkaline. The 2-amino pyrimidine is extracted with hot benzene.

The second method differs largely in the substitution of beta-ethoxyacrolein diethyl acetal for beta-alkoxyacrolein acetal.



By Ewing Galloway

Harvesting and handling resin- and turpentine-containing pine gum takes a lot of manhours. It takes about two weeks to fill this cup with the "blood" which the pine tree manufactures and sends down beneath the bark to heal the "wound" made by man. Then a new wound must be made.

## New Resins Appear

(Continued from preceding page)

ernment use-restrictions, seem likely to continue for at least a year.

As for rosin, little hope is seen for breaking the present shortage until April or May of next year, when the new crop starts coming in. Current production is low because of the serious shortage of manpower and the large amount of manual labor involved in tapping trees and gathering the gum. Even if more manpower were available, it would not be practical now to increase the crop because the flow of gum practically stops during November and does not resume until April. In view of this, and the lack of appreciable rosin inventories in the country, little improvement can be expected in the WPB use-limitation on rosin, which, as this is written, is 60 per cent of the base period. This obviously will continue to affect the use of rosin as such, or in the form of synthetic resins.

### Natural Resin Situation

Congo gum is the only natural resin of big commercial importance that is available today. Moderate amounts are now being imported from Africa. Other natural resins, such as Damar, Manila and Batu, will probably not be available in quantity for six months or longer. After that, these resins should appear at prices which will make them attractive competitors of some synthetic resins. Further, it is likely that we will see these resins in an improved form — as purified, processed products which will be far more useful than prewar natural resins.

### Substitutes with a Future

It was natural to assume that the substitute resins offered during the war would be inferior to the resins they were designed to replace. Such was not always the case. One resin, for example, which turned out to be superior in many respects to the original was S & W Aroplaz 1306. Offered by U.S.I. in 1943 as a civilian replacement for pure alkyd resins of the type used in architectural finishes, Aroplaz 1306 turned out to be almost the equal of the pure alkyd resin in color retention and durability, and far superior to it in initial gloss and gloss retention.

Although a few of these substitute resins may stay on the job, there is every reason to believe that as resin manufacturers apply their vast wartime experience to civilian business, there will be a steady flow of new products with steadily improving characteristics. S & W Aroplaz 906, described elsewhere in this issue of CHEMICAL NEWS, is a splendid example of the kind of progress expected.

## New Halide Dispersing Agent for Photo Films

In a recent patent, a process for preparing amino cellulose compounds is described which is said to produce a high molecular weight amine which is water soluble, and in which the cellulose is not degraded.

Formerly, amino cellulose derivatives were prepared with harsh reagents such as caustic alkali. The result was degraded cellulose and a water-insoluble product, both characteristics being undesirable in the preparation of silver halide dispersing photographic emulsions.

In one method described in the patent, 46 parts of cellulose acetate-p-toluene sulfonate was mixed with 300 parts ethanolamine, and the mixture maintained at 50 C for three days. Nearly all the cellulose ester was reacted and dispersed in the ethanolamine. The dope was filtered and precipitated in an excess of absolute ethanol. This precipitate was leached with acetone, then extracted with acetone.

The product was found to be readily soluble in water, and to form an almost colorless, clear viscous dope.

## Process Retards Fading of Rayon

Cellulose-acetate rayon fabrics, which are stored in places where coal gas is burned, exhibit a marked tendency to fade. This fading diminishes the value of the fabrics, particularly when it is bolted, as only the exposed edges fade, leaving an uneven color.

A British patent describes a treatment designed to minimize such fading. NN'-diphenylacetamide is pebble-milled with water and a condensation product of betanaphthalenesulphonic acid and formaldehyde. This dispersion is diluted with water or ethanol, and the cellulose-acetate rayon, dyed with 1:4:5:8-tetraamino-anthraquinone, is immersed in NN'-diphenylacetamide dispersion.

When treated and untreated samples of fabric were exposed to the action of coal gas for ten hours the untreated sample was faded and dull, while the treated sample had not changed color appreciably.

### TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

**New type fabrics** for use in clothing, as automobile upholstery, in hosiery, hats and so on, is promised by a new electrostatic coating process. (No. 984)

USI

**A dry ice liquefier**, to transform solid carbon dioxide to the liquid form, is described as having five times the capacity of any other high-pressure liquefier, and to take full sized blocks, thus saving labor of crushing and evaporation losses. (No. 984)

USI

**A plasticizer extender**, for use with cellulose acetate, is said to also improve the heat and light stability and the flexibility of ethylcellulose plastics. (No. 988)

USI

**Effective mildewproofing** is claimed for very low concentrations of a patented organo-mercuric compound. It is specifically intended for bacteriostatic and fungistatic treatment of fabrics, paper, leather and similar products. (No. 987)

USI

**More compact polarizing microscopes** are announced for production within a short time by a leading producer of optical instruments. Changes include new type crystals, which permit the omission of the astigmatizing lens. (No. 988)

USI

**Soldering on aluminum**, stainless steel and monel metal is said to be greatly facilitated by a new flux which breaks surface oxides, thus providing more permanent bonds. (No. 989)

USI

**An insulating paint**, designed to reflect light and heat from its bright aluminum surface, is offered for use on roofs. The asphalt content of this paint is said to give it a high degree of water resistance. (No. 990)

USI

**A plastic upholstery material** is claimed to be resistant to moisture, perspiration, crack, wear, acid and alkali, and to be washable. A variety of colors and finishes is available. (No. 991)

USI

**Metallized glass**, which gives a luxurious effect to bottles and similar containers, is suggested as being of particular interest to consumer-goods manufacturers who want to improve the appearance of their packages. (No. 992)

USI

**A refractory cement**, for setting and repairing fire brick, comes in powder form, is thin-mixed on the job, and is described as withstanding high temperatures, as going from 20 to 30 per cent farther, and as being storable without deterioration. (No. 993)

USI

**A new adhesive**, used to adhere acetate sheeting to paper surfaces, is described as a cold water, flexible glue that forms a bond so tight the paper surface will tear before the adhesive separates. (No. 994)

USI

**Synthetic benzoin**, announced as equal to the natural product, and up to 100% pure, is offered in commercial quantities. (No. 995)

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# INDUSTRY'S BOOKSHELF

## *Amino Acids and Proteins*

THE CHEMISTRY OF THE AMINO ACIDS AND PROTEINS, Edited by Carl L. A. Schmidt. Charles C. Thomas, Springfield, Ill., 1944; \$10.00. Reviewed by L. J. Teply.

IN MOST SPECIALIZED scientific fields there eventually appears a comprehensive book which is generally accepted as the outstanding work on its particular subject. Such was the case when *The Chemistry of the Amino Acids and Proteins* was originally published in 1938. It would perhaps suffice to say that the new edition simply brings the material up to date. Certainly the revision indicates that this book will maintain its position for some time to come.

In the present edition, the original version has been reproduced exactly and an addendum which follows the same chapter arrangement has been added. The addendum may be obtained separately.

It would be almost impossible to treat every phase of the subject exhaustively. Thus, for example, the chemistry of the enzymes is handled only incidentally.

However the coverage achieved is truly remarkable. The topic is introduced by a brief historical survey and concludes with a discussion of the role of proteins in nutrition.

Interest in amino acids and proteins has been increasing sharply during the past few years. This has been particularly true in biology and medicine. The intensive development of microbiological assays for amino acids is acting as a potent stimulus for further research. Steady improvement in methods for hydrolyzing proteins is removing one of the greatest obstacles to progress in protein chemistry. The investigators who are carrying on this work are indeed fortunate in having such an excellent source of fundamental information as Schmidt's *Chemistry of the Amino Acids and Proteins*.

## *Industrial Chemistry Text*

THE CHEMICAL PROCESS INDUSTRIES, R. Norris Shreve. McGraw-Hill Book Co., New York, 1945; 957 pp., \$7.50.

DR. SHREVE HAS filled a need of the chemist and chemical engineer for an up-to-date book on industrial chemical

processes. Its text is voluminous in scope and it contains a very liberal and up-to-the-minute bibliography to aid those who must have more specific data concerning any given process.

A feature of the bibliography is its references to Ullman and consequent inclusion of German practice as of the late twenties. It is the opinion of the writer that it would be well worthwhile to expand this feature as most American texts have a tendency to forget foreign practice except for a very general passing note. The liberal use of flowsheets and drawings throughout is helpful to the user.

One criticism that may be levelled is that the author's promise and attempt to combine a study of unit processes and, to a certain extent, unit operations with the style of the usual text on industrial chemistry has merely resulted in adding more words to an already voluminous text.

The writer recommends the book very highly for use as an opening wedge in developing the desired process information on practically any industrial chemical.

## *Other Publications*

CANADIAN TRADE INDEX. The 1945 edition contains an alphabetical directory of 8,000 Canadian manufacturers, a section listing manufacturers according to products made, a directory of exporters of agricultural produce and allied lines, and an export section. Over 200 new firms have been added since last year. It is published by Canadian Manufacturers' Assn., Inc., 1404 Montreal Trust Building, Toronto 1, Canada. Price \$6.00.

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# BOOKLETS & CATALOGS

## Chemicals

**A835. ADHESIVES.** "3-M Adhesives in Industry" titles a new 12-page booklet of the Minnesota Mining and Manufacturing Co.

**A836. ADHESIVES.** The various natural and synthetic rubber adhesives products manufactured by the B. F. Goodrich Co. are described in a 12-page booklet.

**A837. ADHESIVES.** The handbook, "Resyn Adhesives—When and How to Use Them," has been revised and reprinted by National Adhesives.

**A848. METAL ANALYSIS.** A new bulletin, "Quantitative and Qualitative Determination of Copper, Zinc, and Mercury in Treated Fibers and Fabrics" has been made available from Nuodex Products Co.

**A838. CATALYSIS.** A bulletin (No. 10) titled "Unit Processes Syntheses Catalysis" has been made available by Dr. Henry W. Lohse.

**A839. CAUSTIC-CHLORINE.** A description of a simulated working model of a chlorine-alkali plant in actual operation is contained in a recent booklet of the Pennsylvania Salt Manufacturing Co.

**A840. CELLULOSE ACETATE BUTYRATE.** "Tenite II Melt Coating" titles a 2-page bulletin prepared for the coating and laminating industries by Tennessee Eastman Corp.

**A841. CELLULOSE ESTERS.** A 2-page bulletin of Tennessee Eastman Corp. describes the procedure to be followed in cementing molded Tenite, a cellulose ester plastic.

**A842. CEMENT.** A new resin-type cement, Pennsalt PRF cement is the subject of a small folder issued by Pennsylvania Salt Manufacturing Co.

**A843. CHEM STAMPS.** A price list of Chem-Stamps, for depicting heterocyclic and hydrocarbon nuclei, has just been issued.

**A844. CHEMICALS.** A list of their products, including a description, suggested uses and available shipping containers, is contained in a 4-page folder of the Hooker Electrochemical Co.

**A845. CHEMICALS.** A new 10-page pocket-size booklet describing their industrial chemicals and specialties has been issued by the Pennsylvania Salt Manufacturing Co.

**A846. CHEMICALS.** Price list. J. T. Baker Chemical Co.

**A847. CROTONIC ACID.** The Shawinigan Products Corp. has issued a comprehensive 30-page book which lists the physical and chemical properties and possible uses of crotonic acid, including a bibliography with 285 references.

**A849. METAL COLORING.** Coloring processes for copper and copper alloys and blackening processes for zinc and steel are described in an 8-page booklet of the Enthone Co.

**A850. RUBBER.** A report on the rubber manufacturing industries contribution to the war effort is contained in a 64-page book of the Rubber Manufacturers Assn.

**A851. SILICONE RUBBER.** A brief description of "Silastic," a silicone rubber, is given in a small folder available from Dow-Corning Corp.

**A852. WOOD STAINING.** The licensing system under the patents of Chadeloid Corp. for staining wood with aniline dyes is described in a 10-page booklet.

## Equipment—Methods

**F458. AIR FILTRATION.** "The Magic of Electronics in Air Filtration" titles a 20-page bulletin of the American Air Filter Co.

**F459. BATTELLE INSTITUTE.** A complete indexed list of the various books, journal contributions and patents of the members of the staff of the Battelle Memorial Institute is given in a recent booklet.

**F460. BOILER WATER TREATMENT.** "The Modern Way to Avoid Boiler Troubles" titles a 4-page folder (No. 33) of the American K. A. T. Corp.

**F461. COLOR USAGE.** The Pittsburgh Plate Glass Co. has issued a 24-page booklet describing scientific color usage for industry.

**F462. CONTROLLER.** The complete line of potentiometer controllers of the Bristol Co. is described in a new bulletin (PB 1226).

**F463. CORROSION RESISTANT EQUIPMENT.** Corrosion resistant equipment is the subject of a 16-page bulletin of the U. S. Stoneware Co.

**F464. CRUSHERS.** A special feature of the rolling ring and hammer mill crushers and grinders of the American Pulverizer Co. is the subject of a recent bulletin.

**F465. EQUIPMENT.** "General American Equipment for the Oil Industry" titles an 8-page booklet (No. 300) of the General American Transportation Corp.

**F466. FEED WATER REGULATORS.** An 8-page bulletin (No. 83-C) entitled "Bailey Thermo-Hydraulic Feed Water Regulators" has been issued by Bailey Meter Co.

**F467. FEEDERS.** Feeders for liquid and solid chemicals and flotation agents are described in a 12-page bulletin (No. F6-B6) of the Denver Equipment Co.

**F468. FLEXIBLE PIPE COUPLINGS.** Drinkwater, Inc., has issued a 4-page bulletin giving engineering data and specifications on their new Presto-Lock flexible type couplings.

**F469. GRATING SPECTROGRAPH.** The new two-meter grating spectrograph is described in a 4-page folder of the Applied Research Labs.

**F470. HYDRAULIC POWER SOURCE.** The type 139 hydraulic power source of the John S. Barnes Corp. is the subject of a 2-page leaflet.

**F471. HYDRAULIC SYSTEMS.** An 8-page bulletin (No. 013-G) of the John S.

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A838	A846	F459	F467	F476	F485	F494
A839	A847	F460	F468	F477	F486	F495
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Barnes Corp. gives many pointers for use in design and recommendation of hydraulic systems.

**F472. LEAD AND LEAD-LINED VALVES** are the subject of a recent booklet of the American Smelting and Refining Co.

**F473. LIQUID METER VALVES.** "Morganite Liquid Meter Valves and Slides" titles a 6-page folder of the Morganite Brush Co.

**F474. LUBRICATING SYSTEM.** The advantages of a centralized lubricating system are pointed out in a 4-page folder of the Farval Corp.

**F475. MAGNESIUM.** "Emergency Repair of Magnesium Parts by Gas Welding" titles a 4-page technical memorandum (No. 10) which is available from the Dow Chemical Co.

**F476. METAL CUTTING TOOLS.** A new 52-page booklet titled, "Haynes Stellite Metal-Cutting Tools" has just been published by the Haynes Stellite Co.

**F477. MOTOR-GENERATOR REPAIR.** "Motor-Generator Repair Equipment for Use in Maintenance and Repair of Motor-Generator Equipment," is described in a 36-page catalog of the Ideal Commutator Dresser Co.

**F478. OPEN CHANNEL METERS.** "Bailey

Open Channel Meters" titles a 12-page booklet (No. 62) of the Bailey Meter Co.

**F479. PENETRON.** The Penetron, an instrument for the provision of inspection data on lines, vessels, and their contents without injury to the material being inspected is described in an 18-page bulletin of Texaco Development Corp.

**F480. PLASTICS MOLDING.** The services which the Mack Molding Co. can render in the molding of plastics are noted in a recent 8-page booklet.

**F481. PORTABLE SCALES.** The complete line of scales of the Howe Scale Co. is described in a recent circular (608-P).

**F482. PRODUCTS DIRECTORY.** A comprehensive directory of Allis-Chalmers products and engineering literature is provided in a 32-page booklet of the Allis-Chalmers Manufacturing Co.

**F483. PUMPS.** "Deming Pumps Everywhere" titles a 30-page booklet picturing and describing the manufacture, types, and uses of Deming pumps. Deming Co.

**F484. RADIANT HEATING** "Byers Wrought Iron for Radiant Heating" titles a 52-page bulletin of the A. N. Byers Co.

**F485. REFRIGERATION COMPRESSORS.** Three booklets have been issued by the

Worthington Pump and Machinery Corp. describing their Gas Engine Refrigeration Compressors (Bulletin C-1100-B21), their Steam Engine Driven Refrigeration Compressors (Bulletin C-1100-B22), and their Booster Refrigeration Compressors (Bulletin C-1100-B23).

**F486. ROTAMETER.** The Fischer & Porter Co. has just announced a new edition of their 24-page book, "Theory of the Rotameter."

**F487. ROTAMETERS.** Pictures, drawings and descriptions of their armored meters are described in a recent 12-page catalog (No. 43-E) of the Fischer & Porter Co.

**F488. ROTAMETERS.** The Fischer and Porter Co. has issued the third revised edition (catalog 10-C) "A New Era in Flow Rate Measurement" discussing and illustrating rotameter usage.

**F489. ROTASLEEVE ROTAMETER.** The new Rotasleeve Rotameter for measuring large flows of liquids and gases is described and pictured in a leaflet (82-A) issued by Fischer and Porter Co.

**F490. SAFETY APPLIANCES.** The essential specifications of their line of pressure safety appliances have been tabulated in a 4-page folder (502-A) by J. E. Loneragan Co.

**F491. STAINLESS STEEL.** The Eastern Stainless Steel Corp. has a 96-page handbook, "Eastern Stainless Steel Sheets," ready for distribution.

**F492. STORAGE TANK OIL HEATER.** The Grisco-Russell Co. has issued a bulletin (No. 1641) describing their G-Fin storage tank oil heaters.

**F493. TEST DATA ANALYSIS.** "Statistical Analysis of Test Data" titles a bulletin (No. 773) of the Calco Chemical Division of the American Cyanamid Co.

**F494. TEST EQUIPMENT.** Various types of industrial electrical test equipment are described, pictured, and priced in a 16-page bulletin. Industrial Instruments, Inc.

**F495. TRANSFORMER WELDER.** The new Wilson "Bumble Bee" transformer welder is described in an illustrated leaflet of the Air Reduction Sales Co.

**F496. VACUUM CRYSTALLIZER.** Photographs and drawings are used to illustrate an 8-page bulletin covering the Swenson line of vacuum crystallizers. Swenson Evaporator Co.

**F497. VACUUM PUMPS.** A 4-page leaflet pictures and describes the Microvac high vacuum pumps of the F. J. Stokes Machine Co.

**F498. VALVES.** A 20-page valve "Quiz Kit" can be obtained from Wm. Powell Co.

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100 oz.  
25 oz.  
5 oz.  
1 oz.  
 $\frac{1}{2}$  oz.

### QUININE HYDROCHLORIDE U.S.P.

100 oz.  
25 oz.  
5 oz.  
1 oz.

Orders for 5 oz. quantities or less may be supplied without authorization, provided that end use as an antimalarial or therapeutic agent is assured. For larger quantities, it will be necessary to file Form No. 2945 with the War Production Board.

Merck is proud of its contribution to the Wartime quinine program, having originally supplied a substantial part of the Government's stock-pile from our own reserve stocks at the outbreak of the war. We also expanded our production facilities and continued the manufacture of Quinine and other Cinchona Salts from Government acquired bark for our Armed Forces and essential public health needs during the entire duration of the war.

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# NEWS OF THE MONTH

## Groups Resume Convention Plans

*Several technical associations have formulated definite plans for national meetings, while others are still in the "talk" stage, after the lifting of the O. D. T. convention ban.*

WITH THE recent announcement by Col. J. Monroe Johnson, chairman of the War Committee on Conventions and Director of the Office of Defense Transportation, of the lifting on October 1 of the ban on conventions, technical associations throughout the country are laying plans to resume annual national meetings. The revocation of the restrictions was scheduled on recommendation of the Office of War Mobilization and reconversion, at whose instance they were imposed February 1, 1945.

Many plans are still in the tentative stage because of uncertain conditions for travel and hotel accommodations, and the suddenness with which permission to meet was granted. However, the American Institute of Chemical Engineers has scheduled its annual meeting for December 16-19 at the Stevens Hotel in Chicago. Another annual meeting planned for Chicago will be that of the American Petroleum Institute, to take place November 12-15, also at the Stevens. As last year's convention was skipped, this will be the 25th annual event.

The National Farm Chemurgic Council, Inc., will hold its deferred 11th annual meeting March 18-20, 1946, at the Statler Hotel, St. Louis, Mo. The 12th annual meeting will be held in the fall of 1946, in Cincinnati, Ohio; the date was still undecided when this publication went to press according to Ernest L. Little, managing director. The American Ceramic Society has scheduled its 48th annual meeting for April 28-May 1 at the Hotel Statler in Buffalo.

The annual meeting of the Technical Association of Pulp and Paper Industry is scheduled for the week of February 24, 1946, at the Hotel Commodore, New York. An attendance of approximately 1,000 is expected. Plans of the Electrochemical Society include four divisional meetings to be held in Chicago, October 5; Columbus, October 12; Philadelphia, October 17; and New York, October 24; and a national convention which will take place April 11, 12 and 13, in Birmingham, Alabama.

When interviewed, John West of the American Gas Association stated that his organization is making arrangements for

a business meeting to be held October 24 and 25 in New York, which will probably be attended by less than five hundred persons. This is scarcely comparable to the prewar 4-day meetings which were attended by 5 to 6 thousand. The American Leather Chemists Association, represented by Secretary Fred O'Flaherty, has announced that it will hold two regional meetings; one in Milwaukee, October 16-17; and one in New York, October 31-November 1. These were planned before the O.D.T. rescinded orders and will not be treated as national. December 10 and 11 have been selected as the dates for the annual meeting of the American Council of Commercial Laboratories to be held at the Palmer House, Chicago.

The American Institute of Mining and Metallurgical Engineers hopes to meet in Chicago, perhaps the third week in February, for four days of technical sessions. Definite plans have been made by the Institute for the celebration of its 75th an-

## Rand Is Monsanto President



*William McNear Rand has been elected president of the Monsanto Chemical Co., succeeding Charles Belknap, who continues as chairman of the executive committee and board member. Mr. Rand has been a vice-president for eight years. Since November, 1943, when he became a member of the executive committee, he has had his headquarters in St. Louis.*

niversary, September 16-18, 1946, at the Waldorf-Astoria in New York. The American Chemical Society has decided against holding a national convention this fall. Alden H. Emery, assistant secretary, writes that it is "very unlikely that we shall plan for a national meeting earlier than next spring . . . because . . . it takes not less than four months to organize."

On being questioned concerning plans for an annual meeting in December, Mrs. E. D. Sullivan, executive secretary of the National Association of Insecticide and Disinfectant Manufacturers, Inc., said "indications are that it will be held." The American Association of Textile Chemists & Colorists plan tentatively to hold a national meeting, December 13-15 at the Hotel Pennsylvania, New York.

Two groups who have made no plans to meet are the American Pharmaceutical Association and the Association of Official Agricultural Chemists, Inc. Nor have arrangements been announced yet for the annual June meeting of the Manufacturing Chemists Association of the U. S. Ruel W. Elton of the Paint Varnish and Lacquer Association wired that because of crowded hotel and railroad conditions no change in convention plans has been made. A "convention at home" will be held.

The Chemical Market Research Association will hold a meeting October 18 at the Hotel Biltmore, New York.

Discussing the lifting of the ban, Colonel Johnson expressed his thanks to the convention and trade groups and to the nation's hotels for their cooperation during the period the restrictions have been in effect.

He said that the scheduled lifting of the ban by the War Mobilization director is not an invitation to travel. The ODT director asked sponsors of conventions, group meetings and trade shows to defer meetings whenever possible and to keep necessary meetings small until after the peak of the troop movement, which will come early next year.

## SWPC to Continue Loans for Civilian Production

The Smaller War Plants Corporation will continue to make loans to small plants for civilian production, and the agency's 114 field offices throughout the country have been so notified, Maury Maverick, chairman, has made known.

The end of hostilities did not nullify the act of Congress (Public Law 603) that gave SWPC power to afford financial assistance to small manufacturers. "Congress and the President have recognized that a general war situation will continue in the period of transition from

war to peace," the SWPC Chairman said. "This corporation clearly has a definite responsibility of assisting small business to maintain its competitive position, which is necessary to the economic stability of the nation.

"Therefore, we will continue to make available the services of this corporation to keep small business in operation during the transition from war to peace-time activities."

### **WPB Abolishing Consumer Goods Controls**

Almost all War Production Board controls over consumer durable goods now have been abolished, according to Stanley B. Adams, director of the Consumers Hard Goods Bureau of WPB.

From a peak of 94 orders in early 1944, the bureau had cut down to 16 orders before the war in the Pacific ended. As announced, 14 of these orders have been revoked. The remaining two still in effect are concerned with the distribution of domestic mechanical refrigerators and preference ratings for laboratories.

In the electrical field four orders were revoked. The limitation order on domestic laundry equipment (L-6), the production controls on domestic mechanical refrigerators, including gas and kerosene (L-5), distribution control on domestic and commercial electric fans (L-176) and the production and distribution control on domestic electric ranges (L-23-b) were included in the mass revocation.

Laboratory equipment (with the exception of a few items on List A of the revoked L-144) should be in reasonably free supply during the fourth quarter. The present emphasis on research as a factor in the reconversion of other industries will mean a continued high demand for laboratory instruments and apparatus.

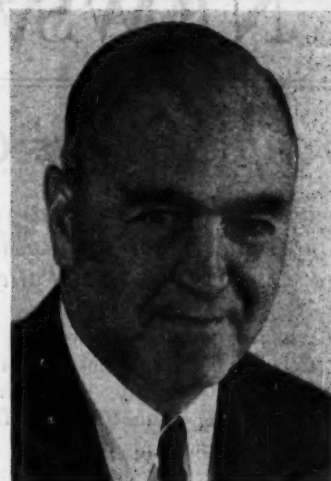
Steel was the material in which the consumers hard goods industries suffered the largest starvation during the war, WPB explained. With the great release of this and other basic materials from military consumption and the consequent revocation of most WPB controls on materials, the converted industries in the consumers hard goods field are now free to produce at rates which should begin to approximate pre-war production by the spring of 1946.

### **ODT Liquid Transport Department Ends**

Discontinuance of the liquid transport department of the Office of Defense Transportation, which directed and coordinated the wartime flow of petroleum, its products, chemicals and other bulk liquids, was announced by the ODT September 5, 1945.

The action was effective September 20, and applies to all shippers of liquid prod-

### **Dow Advances Doan and Williams**



*Leland I. Doan (left), who has been general sales manager for the past 16 years for the Dow Chemical Co., has assumed the position of director of sales. He has been a vice president of the company since 1936. Mr. Doan has announced the appointment of Donald Williams (right) as general sales manager and Donald K. Ballman as assistant general sales manager. Mr. Williams joined the Dow sales staff in 1924.*

ucts in railway tank cars, highway tank trucks and by pipelines.

In a letter of notification Porter L. Howard, director of the ODT liquid transport department, and A. V. Bourque, S. F. Ninness and R. W. Shields, directors respectively of the tank car, tank truck and pipeline divisions, commended all shippers of liquid products for their "wholehearted cooperation, the consideration of our problems which you have so unstintingly given us, and the important part you have played in winning the war.

"It is a pleasure to inform you that we will no longer require any special or general reports, requests for permits or other action on your part, as were required during the war," the ODT officials said.

### **Scientists Inspect German Forest Products**

Headed by director Carlile P. Winslow, eight staff members of the U. S. Forest Products Laboratory are in Germany investigating industrial and technical secrets of its forest products industries, acting director George M. Hunt has announced.

Director Winslow and D. G. Coleman of the laboratory staff are representing a forest products subcommittee of the Technical Industrial Intelligence Committee organized by the Foreign Economic Administration, War and Navy Departments, Office of Strategic Services, War Production Board, and Department of Agriculture. George W. Trayer, Chief of the Division of Forest Products, Forest Service, Washington, D. C., heads the subcommittee. Headquarters of the investigators is London.

Other Forest Products Laboratory staff men doing investigating work in Germany

are R. M. Seborg, J. N. McGovern, H. O. Fleischer, and J. F. Saeman, chemists; Joseph A. Liska, engineer; and Fred F. Wangaard, technologist. Working with the laboratory investigators are G. K. Dickerman, technical director of the Consolidated Water Power and Paper Co., Wisconsin Rapids, Wis.; Fred W. Gottschalk, director of research of the American Lumber and Treating Co., Chicago; E. G. Locke, chemical engineer of the Pacific Northwest Forest Experiment Station, Forest Service, Portland, Ore.; and J. H. Tigelaar, director of research, Haskellite Manufacturing Corp., Grand Rapids, Mich. C. V. Sweet of the laboratory staff who participated with Director Winslow in the early part of the investigation is now returning to this country.

### **OPA Aids Small Manufacturers**

The Office of Price Administration acted recently to help new business get under way, to ease price squeezes on many small manufacturers, and to suspend from price control three basic raw materials that are in good supply.

"The action we are taking today," Price Administrator Chester Bowles said, "is another move designed to remove all unnecessary red tape from business.

"We are issuing an order under which new small businesses in the consumer durable goods field can get their prices fast. Under this order, they will either take prices in line with the comparable product of an established manufacturer or they will get their own temporary price on a cost-plus basis.

"This action will not only speed up the setting of prices for new businesses, but it will remove a heavy administrative

burden from our field offices and enable them to put even more emphasis upon the job of holding living costs down."

In a second move designed to speed full peacetime production, OPA announced that a new order providing for individual company adjustments in most manufacturing fields will be issued next week.

"Under the new individual adjustment orders, a manufacturing firm suffering an over-all loss on all its operations at normal volume may receive price adjustments sufficient to bring it to a break-even position.

"Although this has been described as a 'general rescue clause,' it's not intended as a bail-out for inefficient firms at the expense of the consumer. We should not expect the consumer to pay the brief 'bulge' costs of getting back into peacetime production. The \$20,000,000,000 of corporate reserves accumulated during the war and the tax rebate provisions of corporate tax laws should take care of that.

"Adjustments under this order will not be made simply on a basis of temporarily limited production. It does not apply to the manufacturers reconverting from war work who are already covered by the special adjustment provisions of Supplementary Orders 118 and 119.

"The order is intended to prevent loss of production and employment, which might result from war-created squeezes affecting particular firms. We must be able to ease the peculiar cost situations faced by many businesses—especially small businesses—if we are to ward off hardship to many thousands of workers and reach full production in a hurry. And this new order is designed to do just that."

### Over-all Industry Advisory Committees Remain

Industry advisory committees of an over-all type will be retained on an "on call" basis until the War Production Board is liquidated, WPB has announced in issuing supplementary rules to govern its advisory groups.

During the present demobilization and reconversion period, certain industry committees that represent segments of major industries will be dissolved. Over-all type committees will continue to function. As an example, WPB pointed out that the Over-All Construction Machinery Industry Advisory Committee would remain intact, but that such specific industry segments as the snow plow manufacturers' committee and concrete paver manufacturers' committee would be dissolved.

The Attorney General has assured WPB that the agency may continue to confer with industry advisory committees "until the time the present authority of the War Production Board under the Second War Powers Act, as amended terminates."

WPB also announced that certificates of appreciation will be forwarded to

### R. H. Baldwin Joins Chemical Industries



*Robert H. Baldwin joined the editorial staff of CHEMICAL INDUSTRIES October 1. He is a graduate in chemical engineering from University of Michigan, where he was also editor of the University's engineering publication, the Michigan Technic. For the past eight years he has been a member of the Industrial Engineering Division of E. I. du Pont de Nemours & Co., Inc., recently at the Jackson Laboratory at Deepwater, N. J.*

8,000 members of the 792 committees now active as well as to industry members formerly associated with the agency's advisory groups since the first one was formed late in 1941.

Throughout the war, industry was invited to advise on methods of meeting requirements of the armed services and essential civilian needs, through their representative groups, in conference with Government officials. Swiftly changing aspects of the war and new international situations sometimes made it necessary for the Government to consult more frequently with business men closest to the problems of production.

The agency emphasized that it would continue to seek the advice of industry members whenever new plans affecting production are to be formulated or changed. WPB will continue to schedule meetings whenever any three committee members make the request and the proposed agenda concerns WPB.

### WPB Cancels Projects

At the recommendation of the Rubber Bureau, steps have been taken by the Chemicals Bureau for the cancellation of three projects, intended to increase the annual output of channel black, the War Production Board reported.

Two projects called for expansions of facilities involving the use of federal funds entirely. These projects would have been operated by the Cabot Carbon Company at Eunice, New Mexico, and by the Jefferson Lake Sulfur Company at Clemons, Texas. The third project was a contem-

plated pipeline for H. C. B. Johnson at Stonewall, Oklahoma, and would also have been government financed.

No construction had been started on any of these projects, WPB pointed out.

### Urges Prompt Contract Settlement

The main problem in contract settlement at present is to make sure that contractors with terminations file their claims promptly, Robert H. Hinckley, Director of Contract Settlement, has stated.

Emphasizing that the Government cannot settle claims until they are filed by contractors, Mr. Hinckley urged all contractors who received termination notices to get their claims in promptly.

"Delay in filing claims may seriously impede the entire contract settlement program," he said. "Settlements in July have already been slowed up by failure of contractors to take prompt action on their V-E-day terminations.

"To avoid having industry's funds tied up during the critical reconversion period, provision for interim financing was made by regulations issued by this office. The latest surveys disclose that ample funds are available to finance contractors with terminations either through partial payments or guaranteed T-loans. This is contrary to the statement issued by the National Association of Manufacturers that 'the operating funds of industry may be tied up for six months.' Under existing provisions there is no reason why contractors in most cases cannot get liberal partial payments or guaranteed T-loans within 30 days after application."

### Oil Shale Research Lab Established

Symbolic of a new industry which may arise in the Rocky Mountain West, the cornerstone of the new \$534,000 oil shale research and development laboratory now under construction for the Bureau of Mines at Laramie, Wyo., was laid on Saturday, August 25, Secretary of the Interior Harold L. Ickes announced.

In the presence of distinguished civic and business leaders of Wyoming and Colorado, the cornerstone was laid by Senator Joseph C. O'Mahoney of Wyoming, who sponsored in the United States Senate the synthetic liquid fuels legislation under which this laboratory and other research facilities are being built to determine the best methods of converting the nation's immense deposits of oil shale and coal into a lasting supply of oil and gasoline.

Facilities will be provided for laboratory and small pilot plant experimental studies on processes for refining shale oil, developing and testing retorts, and other research. Initial studies already have been undertaken in a temporary laboratory established in the West Cowboy Dorm. The laboratory will develop

chemical, physical, thermodynamic, and other processing information for a \$1,500,000 oil-shale demonstration plant being established on United States Naval Oil-Shale Reserves near Rifle in Western Colorado.

Together, these installations will help to provide the "know how" for private commercial production of synthetic fuels from the nation's rich oil shale beds. Concentrated largely in Colorado, Utah, and Wyoming, these shale formations are estimated to contain 92 billion barrels of recoverable oil, roughly four to five times the known natural petroleum reserves of the country and enough for more than 60 years at the present rate of use. It is quite possible that oil shale mining and shale oil processing may become one of the West's important industries.

### Oil Industry Film Available

"The Evolution of the Oil Industry," an up-to-date revision of an earlier Bureau of Mines sound educational motion picture, has been released for free showing to schools, colleges, business and civic clubs, industrial and vocational training classes, and the armed forces.

Tracing the development of the petroleum industry from earliest times and showing its importance to modern civilization, the new film is in 16 mm. sound and has a running time of 34 minutes.

Application for free, short-term loans of the film should be addressed to the Graphic Services Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pa.

### WPB Grants Ratings

In a recapitulation of reconversion aid furnished to industry before the end of war against Japan, the War Production Board announced that it had granted a grand total of 1,921 preferential ratings for construction and equipment materials necessary for industrial reconversion between April 1 and July 31, inclusive. These applications, which were for materials with a total value of \$361,683,000, were granted under Priorities Regulations 24 and 28, and Direction 5 to Conservation Order L-41.

Full details of the preferential ratings have been made public by WPB in the following table covering the priorities assistance by principal industries.

Industry	Number of Applications	Value (\$000)			
		Total	Construction <sup>a</sup>	Equipment <sup>a</sup>	Production Materials
Total .....	1,921	361,683	149,910	211,612	161
Chemicals and allied products .....	69	26,182	13,628	12,554	...
Paints and varnishes .....	8	2,547	1,581	966	...
Linseed oil .....	1	1,861	955	906	...
Drugs and medicines .....	4	296	192	104	...
Soap and glycerine .....	2	263	114	149	...
Rayon and other synthetic fibers ..	2	3,319	1,127	2,192	...
Naval stores .....	2	249	207	42	...
Fertilizers .....	2	480	359	121	...
Industrial chemicals .....	34	12,322	6,532	5,785	...
Other .....	14	4,845	2,556	2,289	...

## COMPANIES

### Johns-Manville Builds Research Center

Plans for a new research center in which greatly expanded and accelerated development work will be carried on in the fields of building materials, insulations and many other products needed to help house the nation and increase efficiency of industrial operations have been announced by Lewis H. Brown, president of Johns-Manville Corporation.

It is the first project in a company-wide expansion program in the United States, Canada and abroad which calls for the expenditure of approximately \$40,000,000 and which it is hoped will provide 25 per cent more jobs than were available in the company's most successful prewar year.

The Research Center, the first unit of which is already under construction, is planned ultimately to be a group of six buildings located near Bound Brook, N. J., across the Raritan River from the Manville, N. J., plant. Dr. C. F. Rassweiler, vice-president and director of research, in describing the new Research Center, said that the first unit, in addition to research laboratory facilities, will also "provide 10 experimental factories. Projects initiated in the research laboratory may thus be carried clear through their development and pilot-plant production stages."

### Dow Plans \$15,000,000 Expansion Program

Announcement has been made by A. P. Beutel, general manager of the Dow Chemical Co.'s Texas division, of a \$15,000,000 expansion program for the Freeport, Texas plant.

"The chemical plant expansion, which will start immediately, will include additions to existing plants and construction of new plants for the production of organic and inorganic chemicals," Dr. Beutel stated.

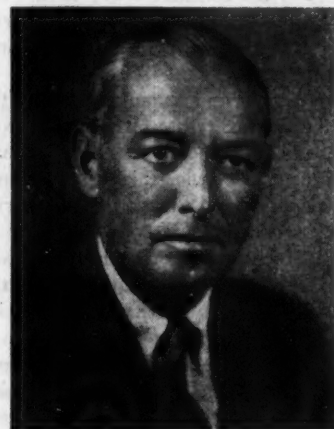
Simultaneously Dr. Beutel revealed that the Dow Magnesium Corp. has been notified by the Reconstruction Finance Corp. to discontinue production of magnesium at its Velasco plant.

Although the RFC order will close down Dow's magnesium plant, it will not

affect the power house, chlorine cells, hospital, cafeteria, water and gas departments and other necessary facilities, it was pointed out.

"There are certain job vacancies at the Dow Chemical Co. plants in the Freeport-Velasco area," he continued. "As employees are no longer needed for lay-up work or operation at Dow Magnesium Corp., the personnel department will make every effort to fill these vacancies with released Dow Magnesium Corp. employees."

### Rice Moves to McKesson & Robbins



G. Webster Rice, widely known Philadelphia chemical executive, has been appointed assistant manager of the industrial chemicals division of McKesson & Robbins, Inc., according to an announcement by F. Dean Hildebrandt, vice president in charge of the division. Mr. Rice was formerly manager of the Philadelphia offices of J. T. Baker & Company.

### Du Pont Expands Nylon Production

A major project to expand facilities for the production of nylon yarn at its Martinsville, Va., plant was announced today by E. I. du Pont de Nemours and Company. The present plant at Martinsville went into operation in November, 1941.

Approximating \$10,000,000 in cost, the new production facilities will be designed to assure increased output of the fine yarns needed for hosiery and other textile uses. This expansion forms a part of the du Pont Company's postwar construction program.

### Casein Co. Plans West Coast Formaldehyde Plant

A new industry in the state of Oregon and the first large scale production of formaldehyde on the Pacific Coast will begin with the construction of a new plant at Springfield, Oregon, by the Casein Company of America, Division of the

Borden Company, it has been made known by W. F. Leicester, Casein Company president.

Expected to be in operation before the end of 1945, the new plant will produce one million pounds of formaldehyde monthly, Mr. Leicester said. The plant will also produce synthetic resin adhesive in large volume for the plywood industry. Extension of the Casein Company, of America's activities in Oregon is in line with the rapid development of the plywood industry in the Northwest, Mr. Leicester said. Resin adhesive needs in the industry in Oregon previously have been supplied from the Seattle area and from the East.

### *Hewitt Rubber Corp. Acquires Robins Conveyors*

Thomas Robins, Jr., president of Hewitt Rubber Corporation of Buffalo, N. Y., recently announced that the company has acquired a controlling interest in Robins Conveyors, Inc., of Passaic, N. J. In addition to directing the management of Hewitt since 1936, Mr. Robins has been chairman of the Robins Conveyors executive committee for the past five years.

### *Edwal-Metalsalts Form New Corporation*

W. M. Stieh, president of Metalsalts Corporation, Paterson, New Jersey, and Edmund Lowe, president of Edwal Laboratories, jointly have announced the formation of Metal Organics, Inc., to produce phenyl mercury and other metallo organic compounds, and carry on an extensive research program for further development in this field.

The new company will have sales offices in New York, Chicago, and San Francisco, and will operate plants in Illinois and New Jersey. The officers and personnel founding this new corporation have had many years' experience in their respective fields, and have at their disposal elaborate research laboratories to carry on development work.

W. M. Stieh has been elected president of the new corporation; Walter Guthman, vice-president and treasurer; Robert O. Weiss, vice-president; and Edmund Lowe, secretary.

### *Hercules Buys Plant for Acetate Production*

Hercules Powder Company has announced the approval by the Reconstruction Finance Corporation of the company's purchase of the B line nitrocellulose plant, adjacent to Hercules' Parlin, N. J., plant. The newly acquired facilities will be utilized primarily to increase the production of cellulose acetate. New equipment must be installed since a different process will be carried on. Because of the uncertainty connected with the construction work, no date for the begin-

ning of operations can be approximated.

Construction of the nitrocellulose facilities was started in September, 1940, when it became apparent that the British were in critical need of smokeless powder for the African campaign. The original plant was designed and operated by Hercules for the British Ministry of Supply and was later purchased from the British by the Defense Plants Corporation.

### *Celanese Consolidates Research*

The initial step in the concentration of the vast technological and research activities of Celanese Corporation of America in the fields of textiles, plastics and chemicals in a single central laboratory has been undertaken with the announcement that the company has acquired buildings for that purpose in Summit, New Jersey, twelve miles outside of Newark.

The buildings were occupied by the Edison Junior High School. The company intends to convert the school into a modern industrial laboratory and, later, make extensions which will double the present size of the buildings. Work on the project is expected to get under way shortly, and it is estimated that eventually approximately 500 scientists, chemists and skilled technicians will be at work in the new unit.

### *Shell Chemical Assumes Distribution*

Shell Chemical Division of the Shell Union Oil Corporation will take over all phases of the distribution of its products in the eastern United States on January 1, 1946, according to an announcement made by L. V. Steck, vice-president in

charge of marketing. G. R. Monkhouse, formerly with Shell Oil Company, Inc., as division manager in Minneapolis and recently in the U. S. Army as Lt. Colonel attached to Supreme Headquarters AEF, will be general manager of the newly constituted eastern division of the company. J. M. Selden, vice-president of R. W. Greeff & Co., Inc., will join Shell as sales manager in charge of marketing for the new organization—and M. L. Griffin will become administrative assistant to the general manager.

### *Newport Industries Plans Naval Stores Unit*

Newport Industries, Inc., has announced plans for the construction of a new plant at Oakdale, La., at an estimated cost in excess of \$2,500,000 for the production of naval stores. The plant site has been acquired and tens of thousands of acres of land have been leased for destumping.

The first unit of the projected Newport plant at Oakdale, La., will have a capacity equivalent to a daily output of 175,000 pounds of rosin, 3,700 gallons of turpentine and 2,200 gallons of pine oil.

### *Company Notes*

MATHIESON ALKALI WORKS, INC., building new warehouse and office quarters at Greensboro, N. C.

BEACON CHEMICAL CORP. is rushing to completion a new plant in Jacksonville, Fla., for occupancy Nov. 15.

DU PONT expands search for ilmenite in North Carolina coastal waters.

The J. T. BAKER CHEMICAL COMPANY, Phillipsburg, N. J., manufacturer of

### *Fulenwider and Johnson Move Up in Hercules*



The appointment of John J. B. Fulenwider as general manager of the cellulose products department and J. B. Johnson as general manager of the explosives department has been announced by Hercules Powder Company. Both men have been assistant general managers of their respective departments. They fill vacancies caused by the election Wednesday of William R. Ellis, general manager of the Explosives Department, and Mahlon G. Milliken, general manager of the cellulose products department, to the posts of vice president.

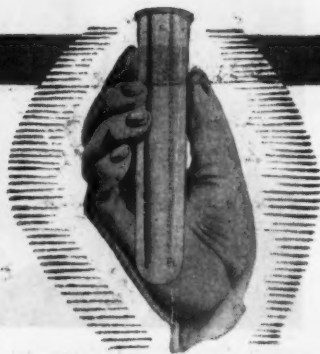
# **HARDESTY** *Research*

## **RESULTS IN BETTER PRODUCTS FOR YOU**

Regardless of directives, shortages, and other problems, HARDESTY laboratory technicians, with long experience in the chemistry of fatty acids, have worked continuously during the past few years perfecting new products and methods—working with one formula after another, finding new uses, until today they know the elusive formulations which, together with highly devel-

oped manufacturing processes, produce products that give outstanding performance to every HARDESTY customer. The resultant high quality is a direct outgrowth of experience necessary to bring results and the knowledge to apply these results to the best advantage. It will pay you to keep in touch with HARDESTY. Laboratory samples are available upon request.

STEARIC ACID • RED OIL • GLYCERINE • PITCH • WHITE OLEINE  
HYDROGENATED FATTY ACIDS • ANIMAL AND VEGETABLE DISTILLED FATTY ACIDS



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chemical products, has completed contract arrangements with Battelle Memorial Institute, Columbus, Ohio, for an extensive program of research on the development of new synthetic chemicals.

## Gaston DuBois Retires After Forty-One Years



*Gaston F. DuBois, vice-president and member of the executive committee of Monsanto Chemical Company, holder of the Perkin Medal and one of the foremost figures in the American chemical industry for 40 years, has retired. According to a company announcement, he will continue as a director and will also serve as a consultant to the company.*

CROTON CHEMICAL CORPORATION has purchased the Laundry Sour business, as conducted for several years by Mr. O. S. Doolittle of Yonkers, N. Y., and Brooklyn, N. Y.

THE SOUTHERN STATES CHEMICAL CORP. has started work on a new \$125,000 zinc sulphate plant near East Point.

THE NATIONAL CYLINDER GAS Co. has disclosed plans to build a new \$100,000 oxygen manufacturing plant here.

THE DOW CHEMICAL Co. has announced a new merchandising plan which will devote its efforts to small package and consumer items. Headed by Sherman W. Putnam, former assistant general sales manager, the new specialty products division is expected to concentrate on insecticides and certain fabricated magnesium articles.

GENERAL CHEMICAL Co., New York City, will award contracts soon for construction of a chemical products manufacturing plant in North Claymont, Del., estimated to cost \$600,000 or more with equipment.

TENNESSEE PRODUCTS CORP. enlarges benzyl benzoate facilities from 10,000 to 50,000 pounds per month.

A \$1,000,000 expansion program at the Ozalid division plant of the GENERAL ANILINE AND FILM CORP. at Johnson City, N. Y., is expected to get underway within the next few weeks when ground

is broken for a \$500,000 factory building, George W. Burpee, General Aniline president, announced. Another \$500,000 will be used to equip the factory and to purchase a plant in Detroit.

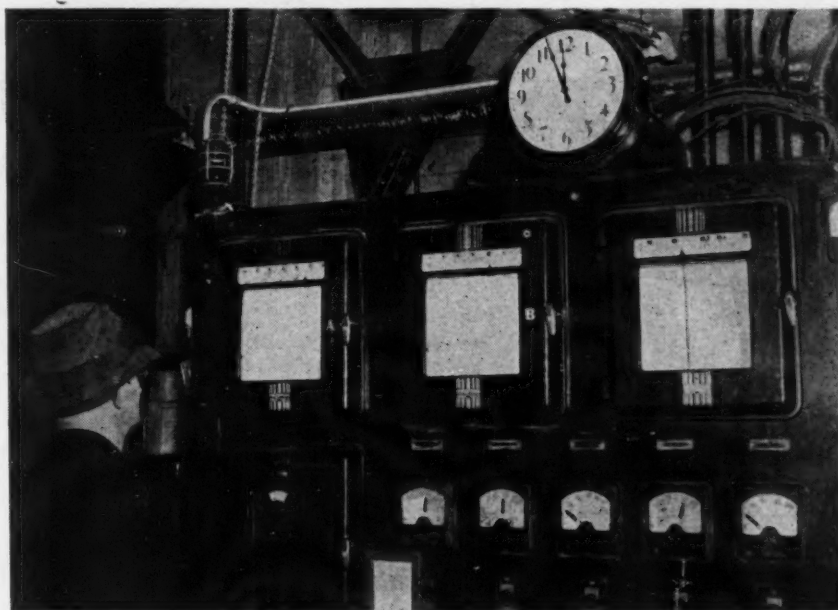
ARISTA OIL PRODUCTS COMPANY, New York, has been appointed general representatives in the United States of the well-known Norwegian firm, Broeder Aarsaether, Aalesmund.

In accordance with instructions from the War Department, HERCULES POWDER COMPANY has begun closing down four of the government-owned plants which the company operates, it was announced today by W. R. Ellis, general manager of the Explosives Department. The four

plants which are being closed down are: New River Ordnance Plant, Pulaski, Va.; Radford Ordnance Works, Radford, Va.; Volunteer Ordnance Works, Chattanooga, Tenn.; and Missouri Ordnance Works, Louisiana, Mo.

## Educational Notes

Six graduate fellowships for work in the chemistry and chemical engineering of wax have been established at American universities by S. C. JOHNSON & SON, INC., Racine, Wisconsin, it was announced today by J. V. Steinle, research and development director. The grants, which total \$30,500, will be used almost entirely



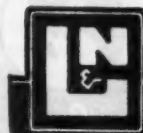
Process operator taking data from Micromax Recorders to help him make sulfuric acid in Atlantic Refining Co.'s Philadelphia plant.

## EFFICIENCY in "Atlantic" Acid Plant Helped by MICROMAX Recorders

Atlantic Refining Co.'s sulfuric acid plant is a model for complete and useful instrumentation—the kind which helps maintain maximum yield of acid.

Among the most useful instruments are the three Micromax Recorders shown above. Two of them show temperature; the third shows acid strength. The process operator knows that as long as he manipulates push-buttons and other controls to keep these instruments within the desired ranges, he is handling the process with economy and success.

If you're looking for dependable and accurate instruments to help regulate temperature, flow, chemical strength or one of many other conditions, let an L&N engineer tell you what Micromax can do.



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TELEMETERS

AUTOMATIC CONTROLS

HEAT TREATING FURNACES

Jrl Ad N-95 (2)

by graduate students for living expenses while carrying on special studies under selected professors in universities which have outstanding records in the wax research field. The schools selected for the Johnson's Wax fellowships, with the amount of grant and professor in charge, are:

Massachusetts Institute of Technology, \$5,000, E. A. Bauser; University of Wisconsin, \$4,500, H. A. Schuette; Cornell University, \$7,500, F. H. Rhodes; Ohio State University, \$4,500; J. B. Brown; Michigan State College, \$3,000, V. R. Gardner; and Northwestern University, \$6,000, no professor selected.

To help industry locate qualified M. I. T. graduates who will be available for employment within the next year or

two, the Alumni Association has, with the assistance of the placement bureau, set up Placement Committees throughout the country. The Placement Bureau in Cambridge will continue to function as usual and will have a complete list of men available in all parts of the country.

## NEWS of SUPPLIERS

Four men have been named to head newly organized sections in GENERAL ELECTRIC's CONTROL DIVISION, new name of the company's former industrial control division, by Karl H. Runkle, manager of the G-E Industrial Divisions. William M. Anthony is manager sales of the industry control section; Edward S. Bush is appointed manager sales of the appliance and aircraft control section; S. V. W. Dockstader has been named manager sales of the general purpose control section; and William J. Stock is in charge of the marketing and promotion section.

Mr. George Spatta, president of CLARK EQUIPMENT Co., Buchanan, Michigan, has announced the appointment of Major Charles H. Warner as manager of the Washington Office, 927 Fifteenth St., N. W., Washington, D. C. During World War II, Major Warner served in the office of Chief Signal Officer, Intelligence Section, and on the Combined Chiefs of Staff.

## Winthrop Names Lasersohn and Rice Vice Presidents



Promotion of Martin Lasersohn to vice-president of Winthrop Chemical Company, and of Justus B. Rice to vice-president in charge of medical research, has been made known by Dr. Theodore G. Klumpp, president.

Dr. Lasersohn, who was assistant to the president, came to Winthrop in 1930 from the Medical College of Virginia, Richmond, Va., on whose faculty he had served for six years.

Dr. Rice has been director of the Department of Medical Research of Winthrop since 1937.

Acquisition of the B. F. STURTEVANT COMPANY, of Boston, Mass., has been announced by A. W. Robertson, Chairman of the WESTINGHOUSE ELECTRIC CORPORATION. The Sturtevant Company becomes a wholly-owned Westinghouse subsidiary, operating as a Division of Westinghouse.

E. G. Cross has been recently appointed supervisor of the production planning and control department of the CROCKER-WHEELER DIVISION, JOSHUA HENDY IRON WORKS at Ampere, N. J. Mr. Cross was formerly associated with Merck & Co., Pacific Aviation, Inc., Given Machinery Co., and Western Pipe and Steel Co., San Pedro Ship Building Division.

WHITTAKER, CLARK & DANIELS, INC., New York, has announced the acquisition of a limestone and calcium carbonate quarry at North Adams, Massachusetts, by MICRO-WHITE CORPORATION, a new Whittaker subsidiary. Ac-

# ASSURED QUALITY

## IN FINE CHEMICALS

Aluminum  
iso-Propylate  
Cetyl Pyridinium  
Chloride and Bromide  
Phenyl Mercury  
Compounds  
Sodium Cyanate

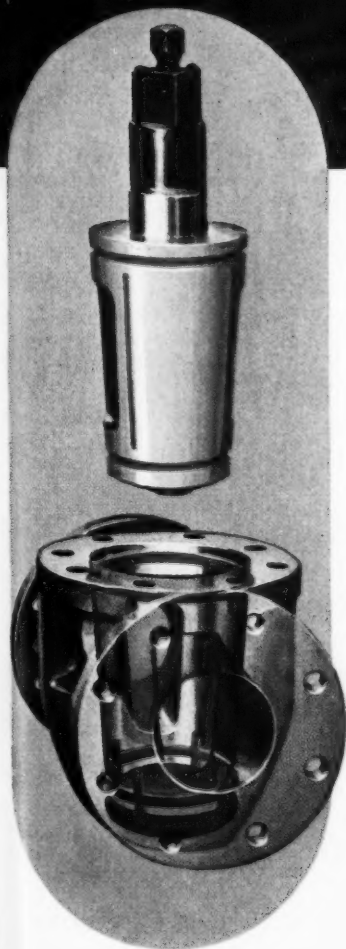
Thorough  
Laboratory  
Control

The new Edwal Catalog and Price List No. 10-C (dated Oct., 1945) listing many new chemicals is now ready. Write for it today.



The **EDWAL** Laboratories, Inc.  
732 FEDERAL STREET CHICAGO, ILLINOIS

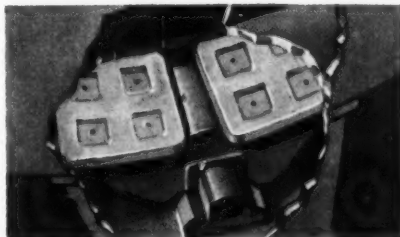
# THE GIANT EYE OF PALOMAR



## WORLD'S LARGEST TELESCOPE

### *Riding on a Film of Lubricant*

BILLIONS of minute bearings, comprising a thin film of lubricant, will support the weight of the world's largest telescope at Palomar, California. The colossal yoke rests upon lubricant pads at each end. A small quantity of lubricant pumped in under 250 pounds pressure, will float the entire telescope, with only 1/600th part of the friction that would be caused by the best roller or ball bearings made. The two huge cylinders of the yoke, bigger than the bodies of locomotives, are cradled in a tilting horseshoe at the north and the spreading wing of a box girder at the south. The giant 200" telescope actually floats clear of its bearings. The pressure of its tremendous weight is fully supported by lubricant with minimum friction.



Here in giant amplification is demonstrated the principle of the Nordstrom Lubricated Valve. The plug of this valve actually floats on a film of pressure lubricant that forms the seat of the plug. *It's easy to turn.*

**KEEP UPKEEP DOWN**

## NORDSTROM

LUBRICATED

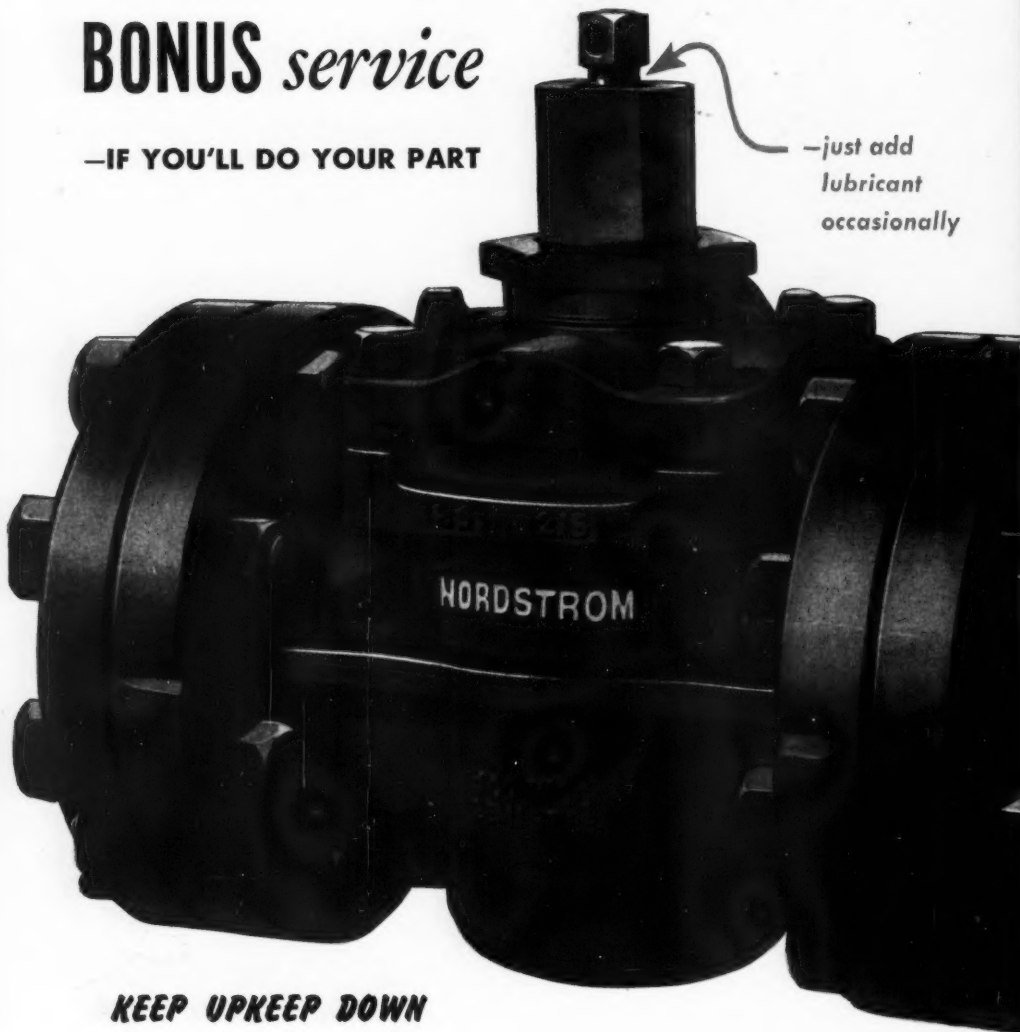


## VALVES

# The valves that give you **BONUS** service

—IF YOU'LL DO YOUR PART

—just add  
lubricant  
occasionally



## KEEP UPKEEP DOWN

WE are just as anxious as you are to see that your Nordstrom Valves stretch their life far beyond the span of ordinary valve service. Critical war demands impose extra obligations. Every old valve kept in service provides one new valve for some other critical need. Check every valve. Put idle valves to work. And most important, keep them lubricated.

## SUGGESTIONS FOR LONGER VALVE LIFE

Be sure that packing glands are properly adjusted.

Use only genuine "Nordco" Lubricants.

Follow factory recommendations as to type of Lubricant for each specific service.

Valves should receive systematic lubrication to give maximum ease of operation, positive shut-off, corrosion resistance and longest life.

Nordstroms have high salvage value. A new plug, lapped into an old body, may add years more of useful life.

Give your valves the same careful attention you give other vital equipment.

Call in a Nordstrom field engineer to assist you in any valve problem.

# Nordstrom

## LUBRICATED VALVES

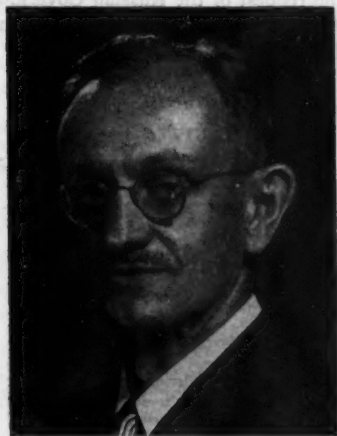
*Sealdport Lubrication*

**MERCO NORDSTROM VALVE COMPANY** — A Subsidiary of Pittsburgh Equitable Meter Company

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European Licensees: Audley Engineering Co., Ltd., Newport, Shropshire, England • South American Representative: The Armco Int'l Corp. • Main Office: Middletown, O.  
PRODUCTS: Nordstrom Lubricated Valves; Air, Curb and Meter Cocks • Nordco Valve Lubricants • EMCO Gas Meters • EMCO-McGaughy Integrators  
EMCO Regulators • Pittsburgh-National Meters for Gasoline, Grease, Oil, Water and other Liquids • Stupakoff Bottom Hole Gauges

According to Clarence E. Clark, president of Whittaker, this is the latest in a series of moves designed to consolidate the position of the parent company in the industrial chemical and mineral field. The new owners have already started operations at the quarry. The new manager of the quarry will be William Dike.

### A. D. Little Increases Staff



Howard F. MacMillin has become associated with Arthur D. Little, Inc., Cambridge, Mass. Mr. MacMillin, formerly president and general manager of the Hydraulic Press Manufacturing Company, Mt. Gilead, Ohio, will direct the application to industry of developments in the mechanical engineering and applied physics fields.

## ASSOCIATIONS

### Correction on A. G. A. Meeting Date

The American Gas Association will hold the annual meeting at the Engineering Societies Building, New York, on October 24th and 25th, not October 14, as was erroneously stated in the September issue of *Chemical Industries*.

### Pacific Northwest A. C. S. Schedules Meeting

Many papers of interest to the industrial chemist will be presented when the Pacific Northwest Sections of the American Chemical Society hold a regional meeting October 20, at the University of Washington, Seattle. More than 30 speakers, representing many fields, are scheduled to read papers at the one-day meeting, which is sponsored jointly by the Puget Sound, Washington-Idaho border, and Oregon sections of the A.C.S.

## PERSONNEL

### Houdry Officials In Russia

Eugene J. Houdry, inventor of catalytic cracking and president of the Houdry



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SOLID • FLAKE • BROKEN  
CRUSHED • WALNUT • LIQUID

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### CARBONATE OF POTASH

Calcined • Hydrated • Liquid

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### CHLORIDE OF LIME

(Bleaching Powder)

Free Flowing—  
35-37% Available Chlorine

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60% FeCl<sub>3</sub> Crystals

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For Fireproof,  
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chemicals available for prompt delivery

## Propylene Glycol, Industrial Grade

The Industrial Grade of Propylene Glycol, commercially available from Dow, is making itself increasingly useful in many operations. It is an efficient water-miscible solvent for organic materials, such as:

Tall oil (ligro)	Pine oil	Ethyl ether
Perchlorethylene	Diethanolamine	Dichlorethyl ether
Monochlorobenzene	o-Dichlorobenzene	Benzene
Dibutyl phthalate	Castor oil	Toluene
Monoethanolamine	Carbon tetrachloride	Dextrin (10% in H <sub>2</sub> O)

Propylene Glycol is also being used in industry as an ingredient of hydraulic fluids . . . as a cooling medium . . . as a coupling agent in wax emulsions and similar products . . . as a modifier for styrene alkyd resins. Additional applications are being developed in other fields.

Dow welcomes your inquiries concerning this useful chemical.

**THE DOW CHEMICAL COMPANY**  
MIDLAND, MICHIGAN

## SILICO FLUORIDES

**SODIUM****ZINC****MAGNESIUM****AMMONIUM****HENRY SUNDHEIMER COMPANY**

Established 1908

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New York 17, N. Y.

Process Corp., and Arthur V. Danner, executive vice-president of the corporation, with several associates, have arrived in Moscow to discuss the operation of Houdry catalytic cracking facilities being installed in Russia. The trip is being made at the request of the Russian Government with the sanction of the U. S. Department of State.

*National Carbon  
Promotes Currie*



*Election of Dr. Lauchlin M. Currie as vice president in charge of research of National Carbon Company, Inc., has been announced by A. V. Wilker, president. Dr. Currie has been acting director of research since 1942, except for fifteen months during which he was Associate Director of the Division of War Research of Columbia University.*

*Taylor Assumes Mathieson Research Post*

Maurice C. Taylor, formerly manager of research at the Niagara Falls laboratories of The Mathieson Alkali Works, has been appointed resident director of research and development, according to an announcement by George W. Dolan, president. Other research department changes are announced as follows: J. Douglas MacMahon, heretofore assistant manager of the sales development department, has been named assistant to the technical director; C. N. Richardson, superintendent of pilot operations, becomes manager of research engineering; and C. Gerald Day, a superintendent in the development department, becomes research and plant liaison engineer.

*Du Pont Makes  
Personnel Changes*

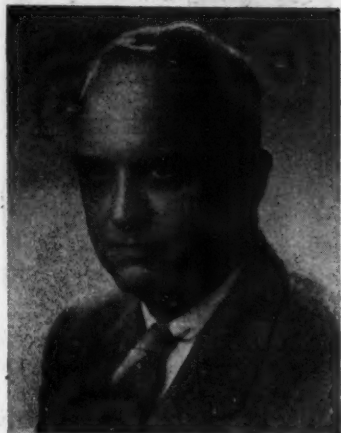
Dr. C. H. Greenewalt has been named assistant general manager of the pigments department of E. I. du Pont de Nemours & Company, effective September 1. Since March 12, 1945, Dr. Greenewalt has been an assistant director of the development department.

The appointment of P. Willard Crane as manager of the technical service sec-

tion of the Sales Department for E. I. du Pont de Nemours and Co. has recently been announced.

The rayon department of the du Pont Company today announced organization changes in its Nylon Division, creating a Wilmington nylon district sales office headed by P. D. Atwood, and a nylon technical service unit, headed by A. W. Staudt.

### Robert Collyer Joins Roxalin as Advertising Manager



Roxalin Flexible Finishes, Inc., of Elizabeth, New Jersey, has announced the appointment of Robert Collyer as advertising manager. Mr. Collyer has been advertising manager for the Calco Chemical Division and of the Textile Department of American Cyanamid Company.

### Hercules Names Babcock Director of Personnel

L. W. Babcock, assistant director of operations of the explosives department, has been appointed director of personnel of Hercules Powder Company.

Edward G. Crum, plant manager of the company's cellulose products plant, Parlin, N. J., has been appointed assistant general manager of the cellulose products department in Wilmington, Del. He succeeds John J. B. Fulenwider, who was appointed general manager of the department August 31. Mr. Crum also will continue to discharge the duties of manager of the Parlin plant for the present. He has been associated with the plant since 1928 and has been manager since 1941. The appointment of B. H. Champion as assistant superintendent of Hercules Powder Company's Synthetics Department plant, at Mansfield, Massachusetts, has been announced by R. F. Schlaan-stine, director of operations for the department.

### Teitsworth to Head Socony Manufacturing Committee

C. S. Teitsworth, vice-chairman of the manufacturing committee of Socony-Vacuum Oil Company, Inc., for the past

# TRONA BROMINE *and* U.S.P. BROMIDES

SODIUM AMMONIUM  
POTASSIUM

## ALSO

REFINED POTASSIUM CHLORIDE  
SODA ASH - SALTCAKE - BORAX  
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DESICCATED SODIUM SULFATE  
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## AMERICAN POTASH & CHEMICAL CORP.

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Save Miles of  
Steps . . . Hours of  
Time

# WHY TROT ALL OVER THE PLACE?

Talk-A-Phone places at finger tip, instant communication contact with your key men. You can talk back and forth, hold a strictly private two-way conversation. You can carry on a conference with several persons at one time. You remain at your desk, send your voice. Work is uninterrupted. Man power, man hours conserved. Production stepped up.

## Talk-A-Phone

The World's most advanced and complete line of inter-communication "Has Everything" . . . superb beauty of design . . . efficiency . . . convenience . . . flexibility . . . economy. There's a unit especially designed for your requirements. See your jobber or write for illustrated catalog today. Learn how little it costs to install and operate inter-communication that "Has Everything."



Talk-A-Phone Mfg. Co.

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five years, has been made chairman of that committee, it was announced today. He succeeds W. F. Burt, who has been made a vice-president and a member of the executive committee.

### Monsanto Announces Changes

The appointment of Arnold H. Smith as director of the foreign department of Monsanto Chemical Co., succeeding Herbert M. Hodges, has been made known by Charles Belknap, president. Mr. Hodges retired October 1, but remains with the company with the title of overseas director until completion of a special mission to China, India and South Africa. Mr. Smith, whose experience includes several years spent in London as manager of the rubber chemical department and as a director of Monsanto Chemicals, Ltd., and the post of manager of petroleum

chemical sales in this country, will be assisted by Marshall E. Young, formerly general export manager.

H. J. Hefferman has been made assistant general manager of sales of the Merri-mac Division of Monsanto Chemical Co. He has been branch manager of the division's New York office, where he is succeeded by W. E. Drown. J. J. McCarthy has been promoted from the development department to the division sales department as manager of textile sales development.

### Dow Names Manager New Sales Dept.

In order to facilitate the specialized services connected with the use of magnesium anodes for cathodic protection of pipelines and structures, the magnesium division of the Dow Chemical Company

has organized a Cathodic Protection Sales Department. Arthur Smith, Jr., has been named manager, with headquarters at Midland, Michigan.

### Hellwig Moves to International Mineral



Arthur P. Hellwig has been made director of sales of the amino products food and pharmaceutical division of International Minerals & Chemical Corporation. Since 1934 Dr. Hellwig has been sales manager of the specialty products division of American Maize-Products Company.

### Baker Advances Feuchter

G. B. Hafer, General Sales Manager of the J. T. Baker Chemical Co., Phillipsburg, N. J., has announced that Harold W. Feuchter will assume new duties as division sales manager of Laboratory Chemicals.

### Personnel Notes

SIDNEY H. BABCOCK has recently been placed in charge of the penicillin manufacturing unit of Lederle Laboratories, Inc., Pearl River, N. Y. Dr. Babcock is head of the chemical development and manufacturing division.

JAMES F. BARNES, formerly with the Carnegie Illinois Steel Co., who will be located in Cleveland, Ohio, and FRANK V. FEORELLO, formerly with Wright Aeronautical Corp., who will be located at the New York office, have joined the technical sales staff of the Barrett Division of Allied Chemical and Dye Corp.

ROBERT S. JUSTICE has recently joined the technical staff of Lakeside Laboratories, Inc., Milwaukee, Wis.

S. ASKIN, industrial relations director of Heyden Chemical Corp., has been appointed an assistant secretary.

PAUL F. DERR has joined the staff of Westvaco Chlorine Products Corp. in the capacity of research chemist.

JOHN F. G. HICKS, member of Corning Glass Works' glass technology staff, has

## FLORANOL

A single chemical used in compounding Rose Odors.  
Blends with or replaces Phenyl Ethyl Alcohol.

Samples on Request

## CYCLAMAL

*The Accepted Basis for Floral Perfumes*  
(Lily of the Valley, Lilac, etc.)

A single chemical having properties most desired by perfumers.

### GREAT STRENGTH

(5 times stronger than Hydroxy Citronellal with which it blends well.)

Result: Economy.

PERSISTENT IN ODOR  
FREEDOM FROM IRRITATION

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FREEDOM FROM DISCOLORATION  
CYCLAMAL IS OF 100% PURITY

Manufactured in the U. S. A.

## AMERICAN DISTILLED OILS

*Bring You the Fragrance of the Pine Forest*

PURE OILS DISTILLED ESPECIALLY FOR US.

*Exceptionally Fine Quality*

OIL OF SPRUCE

OIL OF CEDAR LEAF AMERICAN PURE

OIL OF BALSAM FIR AMERICAN

OIL OF PINE NEEDLES AMERICAN

They come to you as they come from the still in state of absolute purity. Samples will convince you of the added value to be had from these Pure Quality Oils.

## ALDEHYDES

ALDEHYDE C-8  
ALDEHYDE C-10

ALDEHYDE C-18

ALDEHYDE 12-M  
ALDEHYDE C-16

Request for samples on your firm's letterhead will be promptly answered.

*Aromatics Division*  
**GENERAL DRUG COMPANY**

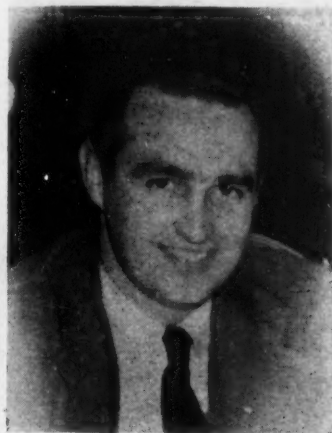
125 BARCLAY STREET, NEW YORK 7, N. Y.

9 S. Clinton Street, Chicago 6

1019 Elliott Street, W., Windsor, Ont.

left for Sao Paulo, Brazil, where he becomes technical and scientific consultant for Brazil's leading glass manufacturing company, Cia. Vidraria Santa Marina, affiliate of Corning Glass Works.

### Velsicol Advances Helies



Wallace F. Helies has been promoted to assistant sales manager in charge of sales research and marketing. Mr. Helies has been with the Velsicol Corporation since October of 1944 and prior to that was associated with the chemical products division of the Standard Oil Company of New Jersey.

M. L. JARBOE, vice-president in charge of finance and accounts of the Diamond Alkali Co., has been elected president of the Pittsburgh Control of the Controllers Institute of America.

ERIC J. HEWITT, formerly director of research for Rare Chemicals, Inc., has joined the staff of Ralph L. Evans Associates, consulting chemists, New York.

LEE H. SIMMONS has joined the staff of the Industrial Chemicals Division of McKesson & Robbins, Inc., according to an announcement by F. Dean Hildebrandt, vice-president in charge of the division. Mr. Simmons comes to McKesson from the International Vitamin Division of American Home Products Corp., where he was in charge of purchasing.

H. C. LUNDQUIST has been promoted from manager of sales operations for the ethical distribution division to general office manager of William R. Warner & Co., Inc., including Schering & Glatz, Inc., Standard Laboratories, Inc., Marcy Laboratories, Inc., and Hudnut Sales Co., Inc.

S. B. BINKLEY has been named head of chemical research for Cheplin Laboratories, Inc., Syracuse, N. Y.

PAUL C. JONES has been named field technical manager of the B. F. Goodrich Chemical Company.

(Turn to page 728)

## Furfural...the answer to many PROBLEMS...

### Are You Looking for a SOLVENT?

Perhaps Furfural is the answer. Its success as a selective solvent in the petroleum industry, where it has been used for producing uniformly superior lubricants since 1933, is being duplicated in the production of synthetic rubber, where these same properties are facili-

tating the refining of butadiene. It is also extensively used for extracting both latent and visible color bodies in refined wood rosin, for glyceride oil separations, and other special solvent refining processes.

### Are You Looking for a RESIN-FORMER OR PLASTICIZER?

Perhaps Furfural is the answer. This versatile aldehyde has long been used in the production of resins through condensation with phenols; interesting new

resins are being developed. Its properties as a resin-former and/or plasticizer are also being utilized in the manufacture of most resinoid-bonded products.

### Are You Looking for a DISPERSANT?

Perhaps Furfural is the answer. Its action as a solvent for resins—particularly phenolics, vinyls, cellulose derivatives and some natural resin esters—renders

it useful in various resin application techniques. Its ability to dissolve paint, varnish and lacquer films contributes to its use as a paint remover.

### Are You Looking for a highly reactive INTERMEDIATE?

Perhaps Furfural is the answer. This aldehyde, with conjugated double bonds, readily undergoes many condensation, reduction and oxidation reactions with the formation of numerous interesting

derivatives such as—furylethylene compounds, furan alcohols or open chain alcohols due to hydrogenolysis, and maleic and fumeric acids.

### Other Uses for Furfural...

And if you are looking for a wetting agent or a bactericide, a penetrant or a fungicide, an insecticide or a herbicide—Furfural may help you make a better product.

Whatever you are looking for, con-

sider Furfural. Our Technical Staff has compiled a wealth of information on Furfural, its derivatives and the literature on the Furans. We are ready to help in applying Furfural to your problems.

### Ample Supply Available

Despite huge war demands for Furfural, all critical requirements were supplied. Now that the war is over, stocks of

Furfural are ample and steps have been taken to keep production facilities ahead of increasing demands.

#### PROPERTIES OF QUAKER FURFURAL

(Furfuraldehyde,  $C_4H_4O \cdot CHO$ )

Amber-colored liquid of high stability and unusual purity

Molecular Weight.....96.08	leum hydrocarbons and glycerol;
Freezing Point, °C.....-37	8.13% by wt. in water at 20°C.
Bolling Range (99%) °C...157 to 167	
Specific Gravity (20/20°C)....1.161	<b>Analysis:</b>
Flash Point (open cup) °C..... 56	Furfural, minimum %.....*99.5
Refractive Index (20/D).....1.5261	Water, maximum %..... 0.2
Surface Tension (dynes/cm).... 49	Organic Acidity, Maximum
Viscosity at 38°C (centipoises) 1.35	equiv./l .....0.023
	Ash, maximum % .....0.006
	Mineral Acidity .....None
<b>Solubility:</b> Completely miscible with	Sulfates .....None
ethyl alcohol, ether, acetone, benzol,	Ketones .....None
butyl acetate, china wood oil and	
most organic solvents except petro-	*As determined by A.O.A.C. method.

Standard Containers: 5, 45, 90, and 520 lb. Drums

†Carload of Drums 80 to 88...41,600 to 45,760 lbs.

Tank Car, 8,000 gal.....75,000 lbs.

Tank Car, 10,000 gal.....95,000 lbs.

†ODT requires maximum loading

The Quaker Oats Company

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FURFURAL • FURFURYL ALCOHOL • HYDROFURAMIDE • TETRAHYDROFURFURYL ALCOHOL

CHEMICALS DEPT.

## CHEMICAL SPECIALTIES NEWS

### **Dow Adds Merchandising Division**

A new merchandising division which will devote its efforts to small package and consumer items was announced recently by Dr. Willard H. Dow, president of the Dow Chemical Company.

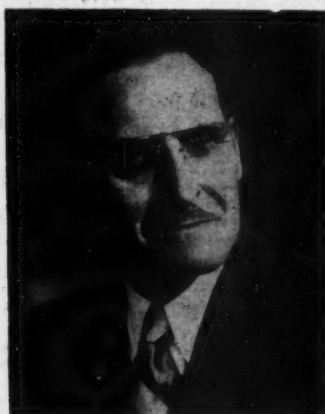
Headed by Sherman W. Putnam, former assistant general sales manager, the new Specialty Products Division is expected to concentrate on specialty insecticides and certain fabricated magnesium articles, but may add to its line as dictated by future developments.

"The decision to set up such an organization in no way conflicts with our present bulk marketing policy," Dr. Dow said, "as its activities will be limited to products for which no adequate means of distribution now exists."

### **Du Pont Building Near La Porte, Texas**

Quantity production of the livestock remedy phenothiazine, new organo-metallic fungicides, organic-sulfur seed and turf disinfectants, and other crop-saving chemicals is planned upon completion early next year of the new \$2,500,000 manufacturing plant, now under construction on the Houston-Galveston canal near La Porte, Texas, the Du Pont Company has announced.

### **Sherwin-Williams Promotes Deeds, Thomas and Prewitt**



The Sherwin-Williams Company has announced three promotions in the production divisions of the company, effective immediately.

C. E. Deeds (left) is appointed general superintendent of the Pigment Products Department with direct supervision of the Chicago White Lead and Coffeyville plants. He will be located at Coffeyville. R. A. Thomas, formerly superintendent of the Coffeyville Plant, will become technical director there. George Prewitt (right) has been named superintendent of the White Lead Plant at Chicago, replacing Mr. Deeds. With the Sherwin-Williams Company since 1917, Mr. Prewitt has served in various capacities at the Coffeyville, Chicago Lithopone, Chicago White Lead and Magdalena plants.

"Just before the end of the war with Japan, the War Production Board approved the company's plans for the construction of these manufacturing facilities," an official of the Grasselli Chemicals Department said. "With the easing of government restrictions, which held up the start of building operations for well over a year, every effort is being made to get this plant completed and in operation to serve American agriculture as soon as possible."

### **Animal Diseases Combated**

As meat remains scarce, any news of prospective improvements in the situation is good news. Animal diseases will cost the American farmer an estimated \$418,000,000 this year, estimates W. J. Murray, Jr., president of McKesson & Robbins. More important, however, is the fact that an extra 100 pounds of meat and poultry would be available for each American family in this meat-poor year if animal diseases could be brought under control.

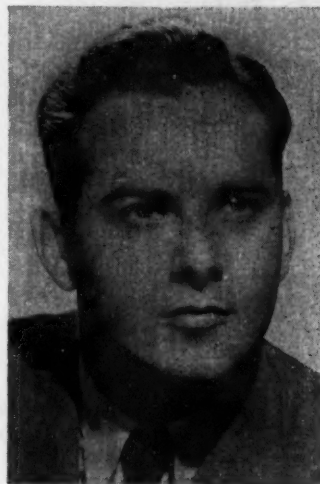
Two significant announcements indicate that the situation may be improved.

A form of penicillin specifically for veterinary use has been developed by Lederle Laboratories and released under the name "Veticillin," and a nationwide network of animal health specialists to advise farmers and retail pharmacists on the problems peculiar to each of 67 areas

has been announced by McKesson & Robbins.

New veterinary remedies and food supplements include hormones, serums, vaccines, penicillin, sulfa drugs and vitamins—all especially designed for livestock.

### **Pfluger Heads Textile Research**



Helmuth L. Pfluger has been appointed director of textile research by Quaker Chemical Products Corporation, Conshohocken, Pa., manufacturers of chemical specialties for the textile and metal industries. He has already assumed his new post in which he will directly supervise new textile product development and service work in the Quaker Laboratories.

### **Reichhold Plans Color Pigments Plants**

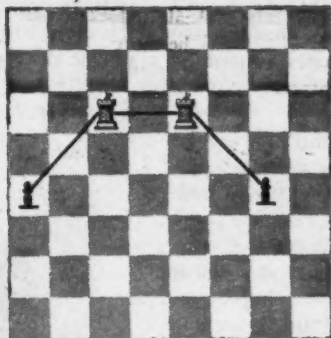
Following the first postwar board of directors' meeting of Reichhold Chemicals, Inc., Henry H. Reichhold, chairman of the board, announced that plans have been completed and the necessary funds appropriated for the erection of three new manufacturing plants for the production of chemical color pigments.

Sites for the three new plants have been selected in Detroit, San Francisco and Tuscaloosa, Alabama. The present expansion program calls for the manufacture of chromium chemicals and certain organic chemical intermediates and dyestuffs in the plant which is to be situated at Tuscaloosa, Alabama.

### **Gorchoff and Bryant Found Specialties Firm**

N. T. Gorchoff, chief chemist, and W. Marvin Bryant, Jr., buyer, of Chap-Stick Co., Morton Manufacturing Co., and affiliated companies, resigned September 1st to operate their own company under the name of Bubble-O-Products to manufacture chemical specialties, cosmetics and kindred items. Offices and

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chess ...  
BUT IT'S A  
GOOD FORMULA**



Becco Electrolytic Hydrogen Peroxide—100 volume—is a clear water-white liquid of outstanding storage stability. It contains 15.0 per cent active oxygen or 27.5 hydrogen peroxide by weight. Its specific gravity is 1.10; apparent pH glass (electrode) 2.1; dry residue—not over 0.10 per cent; ash—not over 0.04 per cent. Can be shipped in tank cars, aluminum drums or in glass carboys. Higher concentrations available in small amounts for research investigations. Becco Electrolytic Hydrogen Peroxide is at present available in limited quantities.

#### SOME SUGGESTED APPLICATIONS

##### Active Oxygen is on Active Duty

##### Other Becco Products:

Ammonium Persulfate\*\*  
Potassium Persulfate  
Magnesium Persulfate\*  
Calcium Peroxide\*  
Zinc Peroxide\*  
Pyrophosphate Peroxide\*  
Sodium Carbonate Peroxide\*  
Urea Peroxide  
Acetyl Peroxide\*

\*Available in research quantities only at present.

\*\*Will be available after the war.

Most universal low-cost bleaching and oxidizing agent.

Does not leave undesirable residue, odor or by-products.

Can be handled through pumps, and well-known feeding and mixing devices.

Antipitting agent in metal plating.

Has excellent bactericidal properties.

Inexpensive promoter for polymerization reactions, especially in emulsions.

Oxygen release from hydrogen peroxide can be precisely controlled as to rate, quantity and size of bubbles. This unique property is of importance for making porous and inflated articles and in the uniform distribution of oxygen gas in reaction mixtures.



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STANDARD AND POWDERED

**BENZALDEHYDE N.F. F.F.C.**  
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Local Stocks

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plant are at 1501 Main Street, Lynchburg, Virginia.

### Lieber with Nox-Rust



*Eugene Lieber has joined the Nox-Rust Chemical Corporation where he will be technical director of manufacturing activities, involving rust-preventives, petroleum additives, industrial lubricants and related products. He will make his headquarters in the Nox-Rust laboratory at 2467 S. Halsted St., Chicago. Dr. Lieber comes from the Standard Oil Company of New Jersey. There he was chemical director of the para-plant of the Bayonne refinery, Bayonne, N. J.*

### Hewitt Advances Hayden and Watkins

Hewitt Rubber Corporation, Buffalo, N. Y., recently announced that Joseph H. Hayden has been promoted to the position of vice-president and William H. Watkins has been named controller and assistant treasurer.

Mr. Hayden has been associated with Hewitt for 27 years. He is chairman of the Mechanical Rubber Goods division of the rubber industry and is a member of the industry's committee to both the WPB and OPA. In assuming his new position of vice-president, he retains the title and duties of secretary. Mr. Watkins has served as a cost specialist and has engaged in market research and analysis. He was recently head of the Hewitt accounting department.

### Amino Acids Useful In Nutritional Studies

The spotlight in the chemotherapeutic field is being turned on possibilities offered by the amino acids. Now that most of them have been identified and isolated, their therapeutic properties are being studied, and they are performing brilliantly in widely varied fields. Laboratory research is being carried on largely with

the purified or synthesized acids, while clinical and large-scale field research and treatment employs the more abundant and cheaper protein hydrolysates formed by hydrolyzing a whole protein, usually casein.

Amino acids will be useful in determining the effect of diet in protecting people from disease and lengthening life, according to Dr. Marvin R. Thompson, president of William R. Warner & Co. Laboratory experiments have shown that proper diet can go a long way in preventing not only diseases of the heart and blood vessels, said Dr. Thompson in a recent address before the Associated Drug & Chemical Industries of Missouri, but also cancer, diabetes, nervous diseases, etc.

Dr. Thompson warns, however, of the danger of jumping to conclusions on the basis of insufficient evidence.

Hydrolysates cost from \$2.50 to \$18 a pound. The average dosage for a man suffering from chronic starvation might be 5 ounces a day for 21 days, allowing for administration of other food, or about \$15 per patient. Pure synthetic aminos cost as much as \$500 a pound. Quantity production, just getting started, will undoubtedly cut the price considerably, as in the case of vitamins.

### Organic Sprays Tested For Plant Diseases

Tests conducted by the Canadian Department of Agriculture this season in the Niagara district have established the suitability of a number of comparatively new organic sprays for the control of various plant diseases, and thereby a fairly substantial Canadian market for these materials is in prospect.

Most experimental attention has been given to Fermate—ferric dimethyl dithiocarbamate. This spray has given satisfactory control of apple scab in Ontario, and ranked first of all materials tested. Too, in that the carbamate is compatible with oil, it fits nicely into the apple spray schedule for codling moth control. In addition it has yielded satisfactory results in the control of cherry leaf spot, cherry brown rot, apple rust, blue mold on tobacco, and anthracnose on tomato.

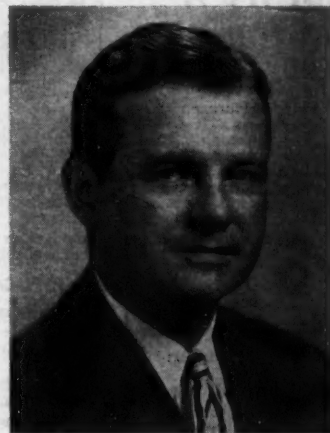
Disodium ethylene bisdithiocarbamate (Dithane) gave outstanding results on potatoes when used with zinc sulfate and lime. It afforded best protection against leaf hoppers, with Bordeaux a close second.

Zinc dimethyl dithiocarbamate (Methasan) another comparatively new material, has given good control of hopper burn on potato and anthracnose on tomato, as well as early potato and tomato blight. However, although both Methasan and Dithane were satisfactory from the standpoint of apple scab control, they produced conspicuous foliage injury.

At the present time the Department

of Agriculture does not recommend any of these organics as a general spray for any crop, but does endorse their use for specific diseases.

### Reamer to Manage Warner in St. Louis



*Richard S. Reamer has been named general plant manager of William R. Warner & Co., Inc., St. Louis Division.*

### Pressure Carboy

(Continued from page 633)

in the case of the liner adopted as standard (.073 inch polyethylene disc, with  $\frac{1}{16}$  inch groove in back) were as follows:

Test No.	Pressure at which venting reached 50 cc or more per minute		Pressure at which venting diminished to 0.2 cc or less per minute	
	lbs. per sq. in.		lbs. per sq. in.	
1	11		6 $\frac{1}{4}$	
2	10		7	
3	10		6 $\frac{1}{4}$	
4	10		5 $\frac{3}{4}$	
5	10		6	
6	10		4 $\frac{1}{2}$	
7	10		6	
8	10		6	
9	10		6	
10	10		5 $\frac{3}{4}$	
11	10		5 $\frac{3}{4}$	
12	11		7	
13	11		6 $\frac{1}{2}$	
14	11		7	
15	11		6 $\frac{1}{4}$	

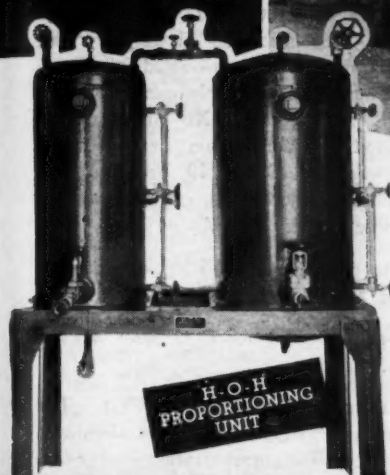
As expected, it was found that temperature had a definite effect upon the venting action of the liner. This can be controlled within narrow limits, however, by thickness of the liner disc.

In authorizing use of the Specification 1D carboy for hydrochloric and nitric acids, the Interstate Commerce Commission, in paragraphs 263(a) (6) (b) and 268(d) (2), stipulated that means should be provided so that accumulated total pressure in bottle shall not exceed 10 lbs. per sq. inch gauge at 130° F., or that bottle will vent at a pressure not to exceed 10 lbs. per sq. inch gauge. Use of the new carboy for other regulatory products, such as inflammable liquids, will undoubtedly come; but specific application will have to be made for each product, supported by adequate temperature-pressure data.

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UNITS

assure correction  
and control of  
CORROSION,  
SCALE, ALGAE  
in Industrial Plants



WRITE  
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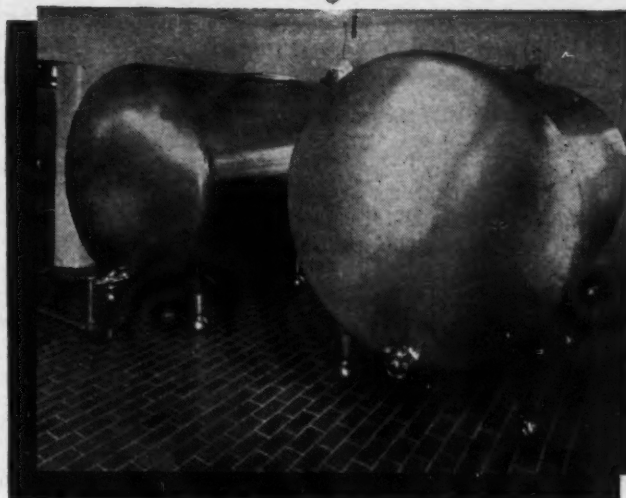
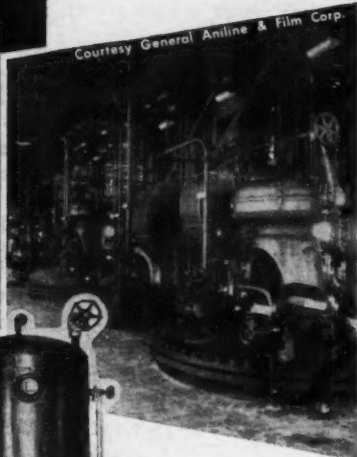


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Founded in 1847, our Experi-  
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# WAR REGULATIONS SUMMARY

**CAFFEINE**—(WPB) Schedule 89, Order M-300, revoked.

**CINCHONA ALKALOIDS** — (WPB) Amendment to Order M-131 permits allocation of quinine for civilian anti-malarial and other essential medical purposes, and of totaquine for all purposes. Restrictions on cinchonine and cinchonidine were relaxed, and small-order exemptions for all four were raised. Quinidine was unaffected by changes.

**CONTRACTOR INVENTORIES** — (OPA) Provision is made by Supplementary

Order 130 for ceiling prices on inventories which suppliers elect to retain upon war contract termination.

**DDT AEROSOLS**—(OPA) Order 73 under GMPR Section 1499.3 (e) sets a retail ceiling price of \$4 on aerosol bombs. Ceilings of \$3 and \$2.40 were set for sales to retailers and wholesalers respectively.

**NYLON**—(WPB) Amendment to Interpretation 1 of L-274 allows the use of nylon in stockings.

**PECTIN**—(OPA) Amendment 10 to Supplementary Regulation 14C to the

GMPR provides that manufacturers of pectin preparations who change their formula must reduce their ceiling prices if production costs are less than 95 per cent of costs required for the old formula.

**QUININE**—See CINCHONA ALKALOIDS.

**ROSIN**—(WPB) Amendment to Order M-387 reclassifies all Schedule B industries as Schedule A industries. Under Schedule A the rosin previously available for military use automatically becomes available for civilian use. The action is retroactive to July 1.

**SURPLUS INDUSTRIAL PROPERTY** — (SPB) Regulation 10 gives preference in buying government-owned plants to small business, preferably owned or controlled by veterans. No preference is provided for contractors in possession. Also, Special Order 19 provides that transfer to another government agency be made at "fair value."

**THEOBROMINE**—(WPB) Schedule 89, Order M-300, revoked.

**TOTAQUINE** — See CINCHONA ALKALOIDS.

**SURPLUS CHEMICALS**—(RFC) The program for supplying surplus chemicals free, except for transportation charges, to schools and similar institutions is limited to lots worth not more than \$300. Where the stock held by the RFC amounts to more than that, the lot may not be broken down to permit free distribution.

## Additional Revocations

**ANIMAL OIL AND NEATSFOOT OIL**—(WFO) Order 128 governing inventories revoked.

**COAL TAR**—(WPB) Order M-297 revoked.

**DYESTUFFS AND ORGANIC PIGMENTS**—(WPB) Order M-103 revoked.

**GLYCERINE**—(WFO) Order 134 governing inventories revoked.

**MATCHES**—(WPB) Order L-263 revoked.

**LABORATORY EQUIPMENT**—(WPB) Order L-144 revoked.

**PEPPERMINT OIL**—(WFO) Order 81 revoked.

**WOOL FAT (LANOLIN)**—(WFO) Order 76 revoked.

## Wyandotte Building New Plant

Ground has been broken for a new  $\text{CaCO}_3$  plant at Wyandotte Chemicals Corporation, Wyandotte, Mich. It was said that production will be increased about 50 per cent by the new plant which is scheduled for completion in the early Spring.

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SYNTHETIC RESINS

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# CANADIAN NEWS

by W. A. JORDAN

## War Plant Disposition Under Way

WITH the end of the Japanese war the disposition of war-created chemical and munitions factories, and their possible future utilization for peacetime manufacture, has become a matter of primary importance, and present indications are that most of the chemical units will be purchased by their wartime operators.

At this writing only a few such transactions have been completed, although a number are in the negotiation stage, namely the purchase by Nichols Chemical (General Chemical) of its Quebec sulfuric acid plant, by Corning of a part of Research Enterprises, Ltd., glass producing facilities, and by Dominion Magnesium Co., Ltd., of the Renfrew, Ont., ferro-silicon process magnesium producer.

However present prospects are that Shawinigan will purchase most of the government-financed units it has operated for the past few years—including carbide, acetylene black, and butanol facilities—and that phthalic anhydride, diphenylamine, and other war-created chemical

plants will also be purchased by the respective operators.

As yet no plan for future disposition of the huge Welland Chemical Works, Ltd., constructed by Chemical Construction Corp. and operated by Cyanamid, has been made public, but it is felt that the plant will continue under government ownership for some little time to come and eventually be purchased by its operators, possibly in part, at least, as a melamine producer. The prospects for the Alberta Nitrogen Co., Ltd., operated by Consolidated Mining and Smelting Co., Ltd., are regarded as parallel.

The ammunition plants are, by and large, being sold for multiple occupancy purposes, and one of the more interesting developments has been the leasing of the D. I. L. Ajax plant townsite by the University of Toronto, where some 3,000 applied science students, mainly returning veterans, can be accommodated and which will operate as supplemental to the University's nearby Toronto headquarters. There is a suggestion also that part of

the plant may become a postgraduate school for engineering study and practice.

## Marathon Mills Plan \$15,000,000 Program

One of the largest individual company postwar expansions yet reported in Canada was announced recently by Niles M. Anderson, vice-president of Marathon Paper Mills of Canada, Ltd., who declared that his company plans to spend "at least" \$15 million in construction of its new plant at Peninsula, on the north shore of Lake Superior.

Originally, the company intended to construct a 200 ton per day bleached kraft mill at a cost of about \$10 million, and a \$1.5 million townsite. The revised plans, based on increased pulp needs of the parent Marathon Corporation, Rothschild, Wis., call for a \$12 million, 300 ton per day mill, and a \$3 million townsite.

The company's recently acquired timber limits average: spruce, 55 per cent; jackpine, 30 per cent; and hardwoods, 15 per cent, with all the coniferous trees of fine, strong fibre due to slow, winter-regulated growth.

Initial production is scheduled for next June, with the entire output to be shipped, mainly by lake freight, to the parent U. S. Marathon mills.

## Results of Mass DDT Budworm Test Doubtful

Although complete official details have not been released at press date as to the effectiveness of the DDT aerial spraying of 100 square miles of spruce budworm infested forest in the Lake Nipigon area, preliminary observations indicate that the immediate kill realized in the experimental spraying fell far short of what might be desired. Estimates of the kill, by several authorities, vary from 30 to 60 per cent, whereas it is felt that anything less than 90 per cent in the case of the rapidly propagating spruce budworm is of minor value.

In previous sprayings of smaller areas in Northern Ontario and Quebec, partly by autogyro, much more promising results were attained, with a budworm kill as high as 98 per cent. In most instances, however, the DDT application was heavier—varying from 3 to 5 pounds per acre—which, in turn, took a heavy toll of crayfish, snakes, frogs, trout, and small fish, as well as causing some damage to broad-leaved trees.

The Lake Nipigon spraying was conducted from specially equipped PBY's flying at about 200 feet, with a distribution objective of one gallon of spray—containing one pound of DDT—per acre. It is believed that one major reason for the lower effectiveness of this treatment is the fact that the spray was released

## Canadian Atomic Energy Headquarters



The Petawawa pilot plant for the production of materials for the release of atomic energy is on the Ottawa River, near Chalk River, Ontario. Estimated to cost \$12,000,000, the plant is a part of the combined United Kingdom-United States-Canadian program. It is reported that the plant will produce plutonium using heavy water as a moderator instead of graphite as used in the U. S. process. Canada has a plant at Trail, B. C. for manufacture of heavy water. It is also planned to establish a branch of the National Research Council in close association with the Petawawa plant to carry out research on the application of atomic energy in war and in industry, and on the use of its products in research and medicine.



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"THE HEATMASTER JR." Type K-3—2½ KW. output. For laboratory and plastics uses. BTU output, 8,550 per hour. 220 volts, 60 cycle, single phase. 5-15-30 megacycle frequency as specified. Width: 24", depth: 28", height: 59". Weight, approximately 750 lbs. Mounted on rubber casters. As supplied for heating preforms, Type K-3 includes electrodes, built-in work chamber, automatic operation, and constitutes a completely self-contained, ready-to-use model for pre-heating plastic preforms or any other use requiring moderate power. Also supplied as Type K-3-S especially adapted for bonding, welding or sealing thermoplastic sheeting.

"THE WELDMASTER" Type K-1—1 KW. output. For sealing or general purpose use. BTU output, 3,413 per hour. 110 or 220 volts, 60 cycle, single phase. 5-15-30 megacycle frequency. Width: 24", depth: 28", height: 38". Weight, approximately 600 lbs. Mounted on rubber casters. May be fitted with same oven or electrode chamber as Types K-5 and K-3. Excellent as a pilot model for development work or for production requiring limited power.

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into the slipstream, and thereby, particularly from that altitude, adequate applications of the insecticide to the trees was not accomplished. Other, improved, methods of distributing the DDT will be investigated this month by government officials, in cooperation with U. S. A. scientists, in Maryland.

Canadian entomologists stress the experimental nature of the program, and state that observation of the results realized will permit the evaluation of the importance of the many variables involved and lead to the eventual development of the optimum technique. However it is pointed out that aerial spraying should not be regarded at present as holding too much promise for the control of the spruce budworm blight, in particular, and that the basic responsibility for the preservation of timber stands must lie in proper timber management, the lack of which in the past has created today's serious condition. Moreover, the economics of spray treatment are of substantial import, with more than 5,000 square miles of forest in Canada and the U. S. A. infested, and the cost of the 100 square mile treatment placed at upwards of \$500,000.

Subsequent to conducting further budworm investigations, government authorities are considering similar experiments with the employment of DDT for control of the White Pine Weevil, Fall Canker Worm, Leconte's Sawfly, Tent Caterpillar, and the Jackpine Sawfly.

### Imports of Chemicals, 1944

In prewar years Canada was by far the United States' largest single chemical customer, and her 1939 imports of \$29,000,000 in this classification were more than doubled in the war years.

Actual chemical import figures for 1944, however, have been somewhat confusing. Early this year a figure of \$81,000,000 was released. Now an official figure of \$70,000,000 has been received, of which 66.5 per cent is reported as coming from the United States. It is suspected that the earlier figure included some strictly military classifications and that the later one is probably a more accurate indication of chemical imports for industrial consumption.

But most revealing of all to U. S. chemical manufacturers interested in Canada as a postwar market is a detailed breakdown released along with the latest overall figure. Principal items in this breakdown are recorded below, the data based on actual Customs entries.

#### CANADIAN IMPORTS OF CHEMICALS —1944 (In thousands of dollars)

	From U. S. A.	From all countries
Acetone and amyl acetate ..	394	394
Acetylsalicylic acid .....	139	139
Alum cake .....	849	905
Amyl alcohol .....	180	180
Aniline dyes .....	3082	3792
Antimony and titanium oxides	1871	1871

Bauxite .....	3471	9985
Borax .....	281	281
Boric acid .....	128	128
Brick, re magnesite .....	717	717
Brick, fire silica .....	714	714
Butadiene .....	5581	5581
Butyl alcohol .....	400	405
Camphor .....	79	79
Carbon black .....	1583	1583
Castor oil .....	178	178
Caustic soda .....	495	495
Cellulose acetate .....	568	568
Cellulose molding cmpds. ..	769	769
Cellulose nitrate .....	1267	1267
Charcoal, for sugar .....	122	137
Chestnut extract .....	562	562
Chinawood oil .....	68	81
Chlorine, liquid .....	535	535
Chloropicrin insecticides ..	113	113
Chromic acid .....	71	71
Citric acid .....	256	256
Clay, china .....	419	616
Clay, fire .....	283	289
Clays, activated .....	367	367
Clays, other .....	194	194
Coal tar, crude .....	140	140
Coal-tar dye bases .....	705	762
Cornstarch .....	206	206
Crude drugs .....	299	319
Cryolite .....	121	249
Dextrin-starch mixtures .....	260	260
Diatomaceous earth .....	336	336
Dinitrotoluol .....	1128	1128
Disinfectant dips and sprays	1036	1261
Dyeing and tanning cmpds. ..	349	508
Ethylene glycol .....	1058	1058
Fluorspar .....	162	840
Formaldehyde .....	209	209
Formic acid .....	50	50
Gasoline antioxidants .....	178	178
Gelatine .....	155	155
Gelatine, capsules, empty ..	201	201
Gelatine, edible .....	639	805
Glue, animal .....	337	436
Gum arabic .....	50	88
Gum copal .....	45	136
Gums barberry, elemi, gedda, etc. ....	166	182
Kainite .....	124	133
Lac .....	248	390
Lemon and orange oil .....	167	201
Litharge .....	244	266
Lithopone .....	435	932
Magnesite, dead burned .....	453	466
Magnesium sulfate .....	107	108
Manganese oxide .....	411	2370
Medicinal preps. (dry) .....	3538	3873
Medicinals preps. (liquid) ..	1078	1113
Menthol .....	220	380
Nicotine and salts .....	158	158
Oxalic acid .....	50	50
Oxide colors .....	963	1040
Peppermint oil .....	364	373
Petrolatum, toilet grade .....	461	461
Phenol .....	187	187
Phenolic resins .....	385	385
Phosphate rock .....	1691	1710
Phosphate acid .....	88	88
Pine tar .....	112	112
Plasticizers for vinyl resins ..	178	178
Potash, caustic .....	140	140
Potash sulfate, crude .....	158	158
Potassium nitrate .....	149	149
Printing inks .....	158	158
Quartz, ground .....	96	530
Quebracho .....	69	626
Resin glues .....	290	290
Rosin .....	1613	1613
Rubber cement .....	194	194
Rubber substitute .....	2966	2975
Salt, common .....	652	845
Silica .....	914	914
S-sda ash .....	128	583
Sodium bicarbonate .....	229	230
Sodium bichromate .....	243	243
Sodium nitrate .....	407	631
Sodium phosphate .....	140	144
Sodium silicate .....	103	103
Sodium sulfide .....	91	144
Sulfur .....	3875	3875
Sulfuric ether .....	71	71
Superphosphate acid phos- phate .....	1547	1547
Talc .....	131	131
Tartaric acid .....	190	894
Tetraethyl lead cmpds. ....	3379	3379
Therobromine dimethyl sulfate	164	164
Triiodine phosphate .....	148	148
Turpentine .....	1203	1235
Vegetable oils for textiles ..	142	142
Whiting .....	189	279
Xanthates for ores .....	888	888
Zinc oxide .....	137	137

### Penicillin Restrictions Removed

All restrictions on the sale of penicillin to the public, which has been under prescription dispensation in the past, have been removed, and currently the drug is as freely available in any drug store as

aspirin. As a result a tremendous sale of penicillin throat tablets, ointments, and pills is reported to have developed.

The medical profession believes that penicillin should be sold only on prescription, as has been the case, for the reason that its indiscriminate use may lessen the effectiveness of its administration in the case of serious illness. However, government authorities state that because penicillin is non-poisonous its sale cannot be regulated, and there now appears little prospect of regulatory distribution being renewed.

The Canadian market at the present time is supplied by one deep-fermentation plant and two flask type units.

### New Plant for G. H. Wood

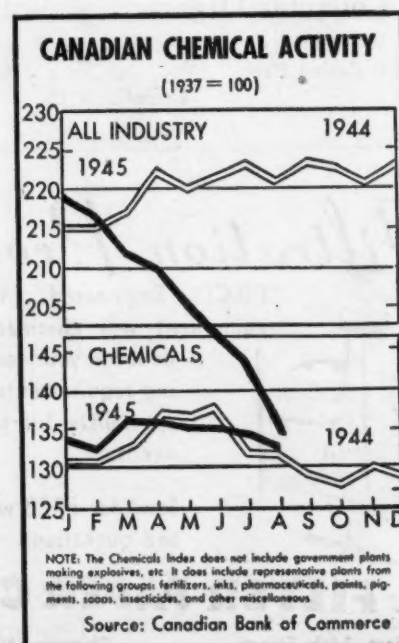
G. H. Wood and Co., Ltd., Toronto, major Canadian manufacturer and distributor of sanitation and building maintenance chemicals, has begun construction of a \$100,000 plant at Vancouver, to serve the West coast market. Initial production is scheduled for early next year.

The building of the Vancouver plant is reported to be an initial step in Wood's plans for further expansion, with the construction of units in both England and the U. S. A. currently under consideration.

### Process Industries—Construction Notes

DOMINION RUBBER CO., LTD., Montreal, is erecting a \$425,000 plant expansion in Montreal and a \$1 million addition to tire producing facilities at Kitchener, Ontario.

DUNLOP TIRE AND RUBBER CO., LTD., Toronto, is building a \$400,000 plant addition.



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# CHEMICAL ECONOMICS & STATISTICS

## Lime Output Slightly Lower

The lime industry in 1944 experienced remarkably little change compared with 1943, according to figures submitted by producers to the Bureau of Mines, United States Department of the Interior. Sales of "open-market" lime totaled 6,473,563 short tons, receding 2 percent from the all-time high of 1943. The average price per ton advanced 8 cents. Quicklime represented 80 percent and hydrated lime 20 percent of the total, the same as in 1943. Sales of agricultural and refractory lime gained slightly, but building lime and that used in the chemical and processing industries experienced small declines. The most difficult problem with most operators was shortage of labor. The steady decline in the number of producers continued in 1944, with a drop of 35 in the number of active plants.

The supply situation with respect to chemical lime was somewhat critical throughout the year. Threatened shortages were due partly to increased demands and partly to impediments to production, the chief of which were curtailment of industrial gas supplies, poor quality of fuel, and inadequate labor. Deliveries were impeded at times by shortages of cars. Allocation was not deemed necessary, but consumers were urged to place orders well in advance of delivery dates. The most striking changes in chemical and industrial uses were the substantial increase in the requirements of the calcium carbide industry and the large decline in the quantity needed for ore concentration. However, throughout the whole field of industrial uses the gains and losses were nearly in balance.

## Kaolin Output Declines

Although sales for some uses, such as rubber compounding, have declined, war conditions have not seriously interfered with kaolin production, according to figures released by the Bureau of Mines, United States Department of the Interior. During the five-year period 1940-44 output of kaolin in the United States averaged 43 per cent higher than in 1935-39. Since 1941, volume has been slowly receding—in 1944 it was 6 per cent lower than in 1943.

Georgia furnished 77 per cent of the tonnage, South Carolina 14, and most of the remaining 9 per cent came from North Carolina, Florida, and Pennsylvania.

Although in wartime the consumption of kaolin in paper is limited by the need for the stronger types of paper used in packaging, that industry as usual took the lion's share, 59 per cent of the total in

1944. Refractories consumed 12, pottery 10, rubber 7, and remaining 12 per cent went into a variety of products such as chemicals, paints, and plasters.

The following table presents the production and value of kaolin by States for the years 1942-44.

KAOLIN SOLD OR USED BY PRODUCERS IN THE UNITED STATES, 1942-44, BY STATES

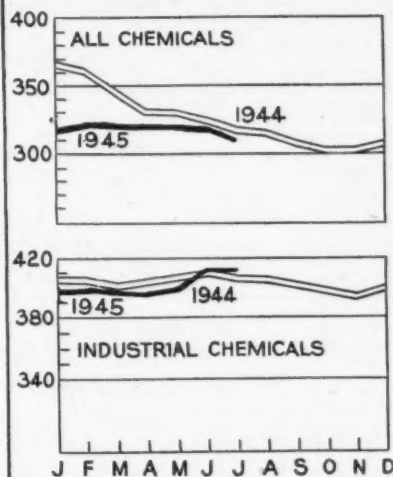
State	1942		1943		1944	
	Short tons	Value \$	Short tons	Value \$	Short tons	Value \$
Alabama	1	1	1	1	1	1
California	10,237	\$119,004	7,167	\$81,855	8,462	\$88,267
Delaware	1	1	1	1	1	1
Florida	1	1	1	1	1	1
Georgia	744,408	6,136,231	732,590	6,232,572	674,400	5,823,424
Illinois	1	1	1	1	1	1
Maryland	1	1	1	1	1	1
North Carolina	1	1	1	1	1	1
Pennsylvania	19,862	125,774	20,474	99,650	15,501	61,245
South Carolina	115,679	974,950	115,340	962,433	118,634	1,068,476
Tennessee	1	1	1	1	1	1
Utah	1	1	1	1	1	1
Vermont	1	1	1	1	1	1
Virginia	1	1	1	1	1	1
Undistributed <sup>1</sup>	56,402	681,274	53,866	690,812	56,059	817,328
	946,588	8,037,233	929,437	8,067,322	873,056	7,858,740

<sup>1</sup> Included under "Undistributed."

<sup>2</sup> Includes States indicated by "1" above.

## U. S. Chemical Production

(1935-39=100)



Note: These data are corrected for seasonal variations.

Source: U. S. Department of Commerce

## Sulfur Output Rises

During the first six months of 1945 sulfur was consumed at a record rate in the United States and production was nearly as high as the record set in 1942 according to the Bureau of Mines, United States Department of the Interior. Production was 23 per cent higher than in

the same period in 1944, and sales were 20 per cent higher. In June, producers shipped more sulfur than in any previous month.

As sales have consistently exceeded production, stocks have declined 323,582 tons since the first of the year.

## Canadian Imports

Total Canadian imports of chemicals and allied products in 1944 amounted to \$70,000,000, of which 86.5 per cent were from the United States.

A detailed breakdown of the figures may be found in the "Canadian News" portion of this issue.

## Bauxite Production Drops Sharply

Domestic mine production of bauxite dropped sharply in 1944 as the result of the accumulation of excessively large stocks and of decreased demand. According to the Bureau of Mines, United States Department of the Interior, output of crude bauxite in 1944 totaled 3,721,135 short tons (3,162,571 tons, dried basis) compared with 8,156,551 tons (6,980,829 tons, dried basis) mined in 1943, a drop of 54 per cent. The 1944 output was valued at \$14,402,497 compared with \$30,659,900 in 1943. Shipments of crude bauxite from mines to processing plants, consuming plants, and Government stockpiles in 1944 totaled 3,676,498 tons (3,124,605 tons, dried basis), a decrease of 53 per cent from 1943.

During 1944 shipments of crude bauxite and processed bauxite from mines and processing plants to consuming industries totaled 3,022,139 short tons (dried equivalent).

PRODUCTION, MINE SHIPMENTS, APPARENT SALES, AND PRODUCERS' STOCKS OF NATIVE SULFUR IN THE UNITED STATES, IN LONG TONS

Period	Production	Mine shipments	Apparent sales*	Producers' stocks**
May 1945	319,976	351,012	365,750	3,838,084
June 1945	309,570	416,272	370,916	3,776,738

\* Calculated from production and change in stocks during the period.

\*\* Producers' stocks at mines, in transit, and in warehouses at end of period.

# SYNTHETIC ORGANIC CHEMICALS: UNITED STATES PRODUCTION, CONSUMPTION, AND STOCKS

(In pounds, except that creosote oil is expressed in gallons.)

The data given in the following table supplement the figures released beginning March 1, 1944, in the Facts for Industry Series 6-2-1 to 6-2-18. Information concerning the limitations of the data, the completeness of coverage, and the selection of items were given in the Series 6-2-1 report.

In the table, production (except as noted in footnote 10) includes material produced whether

consumed in the producing plants or sold. Consumption represents consumption at producing plants only; it includes material produced in such plants, or material purchased or transferred from other plants. Stocks are company stocks, as of the last day of the year or month, located at plant, in transit, or in warehouse, and include purchased as well as produced material.

Item	Production	June 1945 Consumption	Stocks
Acetanilide (technical and U. S. P.)	23,358,276	140,533	125,049
Acetic acid (synthetic) <sup>1</sup>	2,991,009	21,911,572	9,376,101
Acetic acid (natural, including that from calcium acetate) <sup>2</sup>	46,413,796	26,303,907	1,808,968
Acetic anhydride <sup>3</sup>	882,853		1,041,161
Acetylsalicylic acid (Aspirin)	4,874,256		3,148,643
n-Butyl acetate	10,743,983	607,203	9,261,019
Creosote oil, tar distillers <sup>4</sup>	2,871,196	28,615	843,777
Creosote oil, byproduct <sup>5</sup>	362,148		169,514
Cresols, meta-para <sup>7</sup>	1,466,427		
Cresols, ortho-meta-para <sup>7</sup>	2,274,887		1,266,924
Cresylic acid, crude	2,076,816		1,346,095
Cresylic acid, refined <sup>7</sup>	7,460,412		1,988,940
Diethyl ether (all grades)	7,902,427	1,348,389	4,908,875
Ethyl acetate (85 percent)	422,061		
Lactic acid (edible)	256,652	17,936	285,752
Lactic acid (technical)	2,785,187		857,339
Methyl chloride (all grades)	7,559,767		2,107,200
Naphthalene, less than 79° C. (coke-oven operators) <sup>8</sup>	16,276,648		6,485,122
Naphthalene, less than 79° C. (tar distillers) <sup>9</sup>	5,980,097	3,889,079	1,000,871
Naphthalene, refined (79° C. and over)	1,680,660		350,602
Oxalic acid (technical)	21,199		33,330
Phenobarbital and sodium salts	11,802,442	3,014,988	2,516,506
Phthalic anhydride		2,043	26,450
Riboflavin (for human use)	542,678	73,530	572,370
Sulfa drugs (total) <sup>11</sup>			

## SYNTHETIC ORGANIC CHEMICALS: UNITED STATES PRODUCTION, CONSUMPTION, AND STOCKS

(In pounds, except that creosote oil is expressed in gallons.)

Item	April	May	Item	April	May
Acetanilide (technical and U.S.P.):			Ethyl acetate (85 per cent):		
Production	627,308	719,711	Production	9,793,282	9,929,117
Consumption			Consumption	1,345,603	1,632,061
Stocks	235,822	302,917	Stocks	4,785,283	6,027,033
Acetic acid (synthetic) <sup>1</sup>			Lactic acid (edible):		
Production	22,564,074	24,469,552	Production	380,755	496,087
Consumption	22,774,619	22,877,311	Consumption		
Stocks	5,879,194	7,646,072	Stocks	214,150	232,896
Acetic acid (natural, including that from calcium acetate) <sup>2</sup>			Lactic acid (technical):		
Production	3,081,745	3,039,885	Production	375,396	367,526
Consumption			Consumption	7,389	44,096
Stocks	1,672,396	1,757,056	Stocks	242,804	225,861
Acetic anhydride <sup>3</sup>	Published quarterly	Published quarterly	Methyl chloride (all grades):		
Acetylsalicylic acid (Aspirin):			Production	2,366,809	2,473,330
Production	948,074	924,877	Consumption		
Consumption			Stocks	848,243	681,122
Stocks	995,869	972,846	Naphthalene, less than 79° C. (coke-oven operators) <sup>8</sup>		
n-Butyl acetate:			Production	8,000,052	7,579,986
Production	6,479,005	6,131,244	Consumption		
Consumption			Stocks	2,319,868	2,157,844
Stocks	2,315,653	3,034,852	Naphthalene, less than 79° C. (tar distillers) <sup>9</sup>		
Creosote oil, tar distillers <sup>4</sup>			Production <sup>10</sup>	17,359,596	17,570,935
Production	11,152,804	12,899,638	Consumption		
Consumption	757,748	561,769	Stocks	7,202,370	7,023,895
Stocks	10,675,836	11,495,808	Naphthalene, refined (79° C. and over):		
Creosote oil, byproduct <sup>5</sup>			Production	6,157,904	6,212,199
Production	3,111,764	3,173,432	Consumption	3,471,044	3,751,298
Consumption	27,453	25,826	Stocks	2,904,859	2,243,492
Stocks	958,558	873,452	Oxalic acid (technical):		
Cresols, meta-para <sup>7</sup>			Production	1,703,315	1,788,664
Production	815,613	1,036,179	Consumption		
Consumption			Stocks	265,728	389,321
Stocks	407,210	545,246	Phenobarbital and sodium salts:		
Cresols, ortho-meta-para <sup>7</sup>			Production	16,652	35,572
Production		808,082	Consumption		
Consumption	11,543		Stocks	33,593	30,362
Cresylic acid, crude:			Phthalic anhydride:		
Production	2,379,958	2,288,963	Production	11,582,105	12,330,106
Consumption			Consumption	2,929,477	3,248,973
Stocks	812,032	816,806	Stocks	2,355,535	2,523,796
Cresylic acid, refined <sup>7</sup>			Riboflavin (for human use):		
Production	2,730,465	2,273,115	Production		
Consumption			Consumption	3,302	2,188
Stocks	1,323,607	1,445,626	Stocks	25,836	26,298
Diethyl ether (all grades):			Sulfa drugs (total) <sup>11</sup>		
Production	8,296,693	9,199,426	Production	553,497	595,903
Consumption			Consumption	61,558	
Stocks	2,843,322	2,781,748	Stocks	544,486	649,254

<sup>1</sup> Excludes statistics on recovered acetic acid, which are confidential.

<sup>2</sup> Natural acetic acid (produced by direct process from wood) and acetic acid distilled from calcium acetate. These statistics are collected and compiled by the U. S. Bureau of the Census.

<sup>3</sup> Represents all acetic anhydride, including that produced from acetic acid by the vapor-phase process.

<sup>4</sup> Confidential; publication would disclose operations of individual companies.

<sup>5</sup> Product of distillers who use purchased coal tar only.

<sup>6</sup> Product of byproduct coke-oven operators only. These statistics are collected and compiled by the Coal Economics Division, U. S. Bureau of Mines.

<sup>7</sup> Statistics represent total production, consumption, and stocks, including both data reported by coke-oven operators to the Coal Economics Division, Bureau of Mines, and data reported by distillers of purchased coal tar to the U. S. Tariff Commission. Data reported to the two agencies are combined to prevent the disclosure of the operations of individual companies.

<sup>8</sup> Includes only the production, consumption and stocks of coke-oven operators. Statistics combine the three grades (solidifying at less than 74° C., at 74° C. to less than 76° C., and at 76° C. to less than 79° C.) in order to prevent the disclosure of the operations of individual companies. These statistics are collected and compiled by the Coal Economics Division, Bureau of Mines.

lent). Of this quantity 2,615,354 tons were shipped to the alumina industry, including 1,492,594 tons shipped to Metals Reserve Company stock piles. Total shipments decreased 55 per cent from those in 1943 (6,661,583 tons).

Stocks on hand at mines and processing plants at the end of the year totaled 528,700 tons compared with 542,100 at the end of 1943. Consumers' stocks also fell.

## Strontium Shows Sharp Decline

Requirements of celestite (natural strontium sulfate) in signal flares and tracer bullets declined sharply in 1944, and activity in the domestic industry was maintained chiefly by demand for well-drilling weight material, according to the Bureau of Mines, United States Department of the Interior. Small quantities of domestic celestite were sold for the purpose of absorbing iron from caustic-soda liquors, and for making strontium chemicals.

Shipments of chemical and non-chemical grades of celestite by producers in 1944 totaled 3,005 short tons valued at \$48,165, a drop of 60 percent from 1943, when shipments were 7,566 tons valued at \$114,526. Consumption of foreign and domestic celestite in strontium chemicals amounted to about 6,000 short tons in 1944, compared with 13,387 in 1943.

## Bentonite Production Establishes Record

Reports of producers to the Bureau of Mines, United States Department of the Interior show that in 1944 bentonite production increased 14 percent to over a half million tons, and for the sixth consecutive year established a new record.

Although consumption in nearly all uses was well maintained, the principal expansion was in rotary drilling mud. Bentonite owes its growth in this market not only to the increase in the number of holes drilled but also to the relatively higher proportion of holes drilled with rotary rather than cable equipment. Consequently, whereas in 1944 about one-third more oil wells were drilled than in 1943, 76 percent more bentonite was consumed in drilling mud.

\*Includes only the production, consumption and stocks of distillers of purchased coal tar. Statistics combine the grades specified in footnote 8, in order to prevent the disclosure of the operations of individual companies.

<sup>10</sup> For the grade solidifying at less than 74° C., these statistics represent production for sale only; for the other two grades, they represent production both for consumption within the producing plant and for sale. Production for consumption of the grade solidifying at less than 74° C. is excluded in order to minimize duplication as this grade is frequently converted to grades of higher melting point.

<sup>11</sup> Includes acetylsulfathiazole produced both as a sulfa drug and as an intermediate, resulting in an appreciable duplication which is unavoidable.

Source: Statistics collected and compiled by the U. S. Tariff Commission, except where otherwise noted.

(Refer all inquiries concerning these data to the United States Tariff Commission, Washington 25, D. C.)

# CHEMICALS: UNITED STATES PRODUCTION, CONSUMPTION, AND STOCKS, APRIL AND MAY 1945

Statistics on the production, consumption and stocks of chemicals shown in the following table supplement the 1941-1943 figures released February 7, 1944, in "Facts for Industry," Series 6-1-1. Figures for earlier months in formation on the number of plants manufactur-

ing each chemical, and a discussion of the limitations of the data are given in the above-mentioned publication. The production figures represent primary production and do not include purchased or transferred material. The con-

sumption statistics are for consumption only in the plants where each chemical is produced. The stocks figures represent the quantities of each chemical on hand at the end of the month at producing locations only.

Chemical and Basis	Unit	May (Preliminary)			April (Revised)		
		Production	Consumption in producing plants	Stocks at producing plants, end of month	Production	Consumption in producing plants	Stocks at producing plants, end of month
Acetylene:							
For use in chemical synthesis.....	M cu. ft.	(1)	(1)	(1)	(1)	(1)	(1)
For commercial purposes.....	M cu. ft.	(1)	(1)	(1)	(1)	(1)	(1)
Aluminum chloride:							
Anhydrous and crystal (100% $AlCl_3$ ).....	M pounds	5,401	(2)	2,453	4,982	(2)	2,799
Solution (32° Be').....	M pounds	1,022	....	421	1,096	....	462
Aluminum sulfate:							
Commercial (100% $Al_2(SO_4)_3$ ).....	M pounds	(3)	(3)	(3)	(3)	(3)	(3)
Iron free (100% $Al_2(SO_4)_3$ ).....	M pounds	(3)	(3)	(3)	(3)	(3)	(3)
Synthetic anhydrous ammonia (100% $NH_3$ ) <sup>1</sup> .....	Short tons	48,244	23,749	3,997	45,581	22,406	4,301
Ammonium chloride (100% $NH_4Cl$ ).....	M pounds	6,020	....	1,677	5,734	....	1,652
Barium sulfate (Blanc fixe') (100% $BaSO_4$ ).....	M pounds	5,422	4,102	5,016	5,249	3,736	4,558
Bleaching powder (35-37% Available Cl) <sup>2</sup> .....	M pounds	2,708	....	473	2,662	....	485
Calcium acetate (80% $Ca(C_2H_3O_2)_2$ ).....	M pounds	829	....	225	519	....	153
Calcium arsenate (100% $Ca_3(AsO_4)_2$ ).....	M pounds	2,493	273	13,720	*1,568	(2)	*14,640
Calcium carbide (Commercial).....	Short tons	(1)	(5)	(1)	(1)	(5)	(1)
Calcium hypochlorite (true) (70% Available Cl) <sup>3</sup> .....	M pounds	1,439	(2)	845	1,254	(2)	833
Calcium phosphate:							
Monobasic (100% $CaH_2(PO_4)_2$ ).....	M pounds	5,210	(2)	4,557	4,722	(2)	4,965
Dibasic (100% $CaHPO_4$ ).....	M pounds	3,389	(2)	2,081	4,020	(2)	2,518
Carbon, activated.....	M pounds	5,671	(2)	6,439	*5,125	(2)	*5,553
Carbon black (Channel):							
Rubber grade.....	M pounds	41,498	....	9,577	38,511	....	8,125
Other than rubber grade.....	M pounds	2,875	....	11,290	2,658	....	11,909
Carbon dioxide:							
Liquid and gas.....	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Solid (dry ice).....	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Chlorine.....	Short tons	110,746	63,048	6,705	103,478	60,350	5,875
Chrome green (C. P.).....	M pounds	419	63	925	407	34	997
Chrome yellow and orange (C. P.).....	M pounds	3,382	402	1,758	3,552	286	2,004
Copper acetoarsenite (Paris green).....	M pounds	(1)	(2)	(1)	(1)	(2)	(1)
Hydrochloric acid (100% HCl).....	Short tons	37,152	23,464	3,068	37,597	23,461	2,984
Hydrogen.....	Millions of cubic feet	(1)	(1)	(5)	(1)	(1)	(5)
Hydrogen peroxide (100 volumes).....	M pounds	2,738	(2)	1,235	2,779	(2)	2,352
Lamp black.....	M pounds	1,406	....	427	1,156	(2)	485
Lead arsenate (acid and basic).....	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Iron blue (C. P.).....	M pounds	822	102	775	813	103	791
Lead oxide:							
Red (C. P.).....	M pounds	7,717	290	3,451	7,845	325	*3,927
Yellow (C. P.).....	M pounds	27,584	6,724	9,019	27,404	8,943	8,263
Methanol:							
Natural (80% $CH_3OH$ ).....	M gallons	341	(5)	538	293	(5)	446
Synthetic (100% $CH_3OH$ ).....	M gallons	6,715	(2)	(2)	6,378	(2)	(2)
Molybdate chrome orange (C. P.).....	M pounds	151	(2)	109	135	(2)	152
Nitric acid (100% $HNO_3$ ).....	Short tons	41,757	36,335	5,789	40,053	34,098	5,788
Nitrous oxide.....	M gallons	(1)	(1)	(1)	(1)	....	(1)
Oxygen.....	S. T. F.	(1)	(1)	(6)	(1)	(1)	(6)
Phosphoric acid (50% $H_3PO_4$ ).....	M cu. ft.	(1)	(1)	(6)	(1)	(1)	(6)
Potassium bichromate and chromate (100%).....	Short tons	59,091	50,538	14,528	*59,568	*50,576	13,985
Potassium hydroxide (caustic potash) (100% KOH).....	M pounds	688	....	(2)	516	....	411
Soda ash (Commercial sodium carbonate):							
Ammonia soda process:							
Total wet and dry (98-100% $Na_2CO_3$ ) <sup>4</sup> .....	Short tons	388,044	....	....	378,385	....	....
Finished light (98-100% $Na_2CO_3$ ) <sup>5</sup> .....	Short tons	206,019	55,845	28,508	210,130	53,526	37,284
Finished dense (98-100% $Na_2CO_3$ ) <sup>6</sup> .....	Short tons	125,807	3,665	7,099	114,133	1,815	12,510
Natural <sup>7</sup> .....	Short tons	(3)	....	....	15,171	....	2,999
Sodium bicarbonate (refined) (100% $NaHCO_3$ ).....	Short tons	16,393	(2)	4,625	15,407	(2)	4,073
Sodium bichromate and chromate (100%).....	Short tons	6,955	(2)	790	6,852	(2)	847
Sodium bisulfite (100% $NaHSO_3$ ).....	M pounds	3,263	(2)	1,063	3,486	(2)	1,139
Sodium hydrosulfide (100% $NaSH$ ) <sup>10</sup> .....	M pounds	2,414	(2)	322	*2,318	(2)	*491
Sodium hydrosulfite (100% $Na_2S_2O_4$ ).....	M pounds	3,054	(2)	732	3,174	(2)	904
Sodium hydroxide (caustic soda): <sup>11</sup>							
Electrolytic process:							
Liquid (100% $NaOH$ ).....	Short tons	103,575	....	....	97,440	....	....
Solid (100% $NaOH$ ).....	Short tons	18,299	....	....	18,577	....	....
Lime-soda process:							
Liquid (100% $NaOH$ ).....	Short tons	65,315	35,360	55,886	*63,860	32,369	*57,017
Solid (100% $NaOH$ ).....	Short tons	21,955	....	....	*19,840	....	....
Sodium phosphate:							
Monobasic (100% $NaH_2PO_4$ ).....	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Dibasic (100% $Na_2HPO_4$ ).....	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Tribasic (100% $Na_3PO_4$ ).....	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Meta (100% $NaPO_3$ ).....	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Tetra (100% $Na_4P_2O_7$ ).....	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Sodium silicate:							
Soluble silicate glass, liquid and solid (anhydrous).....	Short tons	43,955	3,696	49,097	36,796	3,311	43,455
Sodium sulfate:							
Anhydrous (refined) (100% $Na_2SO_4$ ).....	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Glauber's salt (100% $Na_2SO_4 \cdot 10H_2O$ ) <sup>9</sup> .....	Short tons	(1)	(2)	(1)	(1)	(2)	(1)
Salt cake (crude) (commercial) <sup>9</sup> .....	Short tons	(1)	(1)	(1)	(1)	(1)	(1)
Sulfur dioxide.....	M pounds	(1)	(1)	(1)	(1)	(1)	(1)
Sulfuric acid: <sup>12</sup>							
Total (100% $H_2SO_4$ ).....	Short tons	868,682	....	....	834,152	....	....
Chamber process (100% $H_2SO_4$ ).....	Short tons	269,394	....	....	262,387	....	....
Contact process (100% $H_2SO_4$ ) <sup>13</sup> .....	Short tons	599,288	....	238,465	571,765	....	230,858
Net, contact process (100% $H_2SO_4$ ) <sup>13 14</sup> .....	Short tons	507,590	....	....	475,590	....	....
White lead:							
Basic lead carbonate (C. P.).....	Short tons	3,282	1,144	2,304	3,432	989	2,566
Basic lead sulfate (C. P.).....	Short tons	1,086	....	121	781	....	79
Zinc yellow (zinc chromate) (C. P.).....	Short tons	1,273	(2)	292	1,514	(2)	430

<sup>1</sup> Data by months are collected on a quarterly report form and are presented in releases in this "Facts for Industry" series covering the months of March, June, September and December. <sup>2</sup> Data cannot be published without disclosing operations of individual establishments. <sup>3</sup> Not yet available. <sup>4</sup> Data for a small amount of aqua ammonia are included in the figures reported by one company. <sup>5</sup> Not available; see "Facts for Industry," Series 6-1-1. <sup>6</sup> Data for oxygen stocks are no longer collected. <sup>7</sup> Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finished light and finished dense soda ash. For detailed discussion of soda ash statistics, see "Facts for Industry," Series 6-1-1. <sup>8</sup> Not including

quantities converted to finished dense soda ash. <sup>9</sup> Natural soda ash, Glauber's salt, crude salt cake and sulfuric acid data collected in cooperation with Bureau of Mines. <sup>10</sup> Revised figures for earlier months will be shown in a subsequent release of this series. <sup>11</sup> Production figures represent total production of liquid material, including quantities evaporated to solid caustic and reported as such. Consumption figures represent quantities of both liquid and solid caustic consumed in producing plants exclusive of quantities of liquid caustic evaporated to solid. Stocks figures include quantities on hand of liquid and solid material. <sup>12</sup> Includes sulfuric acid of oleum grades. <sup>13</sup> Excludes spent acid. For detailed explanation see "Facts for Industry," Series 6-1-1. <sup>14</sup> Revised.

## Chemical Industries



A total of 8,541,682 short tons (100 per cent basis) of new acid was produced last year, five-eighths by the contact process and the remainder by the chamber process. The difference between that figure and the gross production of 9,244,507 tons

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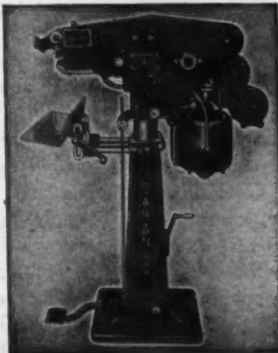
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ALBUMIN TANNATE, U. S. P.  
(chemical name for Tannalbin)

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N. N. R.

BETA NAPHTHYL BENZO-  
ATE, N. N. R.

CALCIUM BENZYL PHTHAL-  
ATE, pure

BENZYL DISULFIDE

CALCIUM IODOBEHENATE,  
U. S. P.

CALCIUM LEVULINATE, pure

CAMPHOSULFONATES

CAMPHORIC ACID, C. P.

ETHYL CHAULMOGRATE,  
U. S. P.

HELMITOL, N. N. R.

HEXAMETHYL — DIAMINO-  
ISOPROPANOL-DI-IODIDE  
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pound (chemical name for  
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# MARKET OUTLOOK

## *European Countries Market for Specialties*

### *Steel Production Fore- shadows Coal Tar Supply*

### *Expert Predicts Insecticide Expansion*

### *Domestic Potash Reserves A Problem*

### *Small Increase Seen in Carbon Black Use*

### *Review of Chemical Commodities Markets*

## *Specialties Export Market Foreseen*

Growing opportunities for American exporters will be created by the relaxation of stringent military economies and subsequent rehabilitation of European countries, opening the way for a gradually increasing use of such civilian items as toothpastes, hair tonics, hand lotions, and pharmaceuticals.

While it was not possible to trade in any European country up to last week, trading restrictions have now been eased in some countries. While no details have as yet been given regarding the very recent lifting of certain restrictions in Norway, Sweden and Denmark, it is believed that trading will continue to be conducted under a priority system. Hygienic products and pharmaceuticals are not widely manufactured in the Scandinavian countries.

The lack of pharmaceuticals and toiletries in Nazi occupied Europe was almost 100 per cent during the war with the exception of the small amounts allocated by Germany as a token against the large quantities of both raw materials and products commandeered in the conquered nations.

While it remains to be seen just what conditions will be imposed by European nations on imports from England, drugs, pharmaceuticals and household remedies and other items will be needed in large amounts in many countries. Only France, Switzerland and Germany have substantial pharmaceuticals and toiletries manufacturing industries.

## *Coal Tar Chemicals Outlook Good*

As steel production goes, so goes the coal tar chemicals industry.

It was feared that the end of the war would curtail steel production to a great extent, thereby reducing coking operations and making less coal tar available.

This fear has failed to materialize, and instead the heaviest peacetime demand for steel in history is resulting in record-breaking civilian production. The week following Japan's surrender was marked

by a slump to 70 per cent of capacity; but production is now up to 80 per cent, and indications are that it will approach the July level of 86 per cent.

Four major factors are seen responsible: the large pent-up civilian demand for durable goods; fear of a strike in the steel industry; the threat of higher prices due to higher wages; and the necessity of a high rate of production to assure profits at the present price levels.

## *Insecticide Industry Expansion Seen*

Insecticides, fungicides, and seed prot-

## *Market Review*

**Heavy Chemicals.**—There is little likelihood of any drastic price reductions in industrial chemicals. Despite increased costs, they have remained at low price levels during the war.

Cancellation of Lend-Lease, combined with increased labor supply and reduced military requirements, is expected to ease shortly the supply situation with respect to industrial chemicals. Reduction of demand for dry cells, for instance, will make more sal ammoniac available. Better quality paper is in prospect when chlorine can be freely used for bleaching. A sharp decline in calcium acetate production is expected since the demand for acetic acid, for the manufacture of which the entire wartime production of the salt was used, will undoubtedly fall off.

It is doubtful that the supply of Chilean nitrate will be sufficient to meet demands. There is a potential market for 2 million tons, but output is not expected to exceed 75 to 90 per cent of that figure. The expected drop in demand for alkalies failed to materialize; consumption is still running at wartime levels. Contracts for three Government channel black plants have been cancelled because inventories of the material have been building up. Among items which continue to be scarce are casein, alkalies, sodium phosphates, sodium silicate, oxalic acid, bichromates, and calcium chloride.

**Fine Chemicals.**—Mercury is still declining in price, and the present trend has forced some domestic producers out of production. Failure of the Government to renew contracts for mercuric oxide dry cells is expected to force the price still lower.

It is probable that a portion of the 450,000-ton excess ammonia capacity will be converted to methanol. This will not only partially solve the excess capacity problem, but make more for-

maldehyde available for plastics. Post-war ethyl alcohol consumption is expected to exceed that prevailing before the war; demand at the 1941 level is anticipated. The market for DDT solvents has risen sharply since WPB released the material for civilian use. End of allocation will release chlorinated solvents to meet the heavy demand.

The Army has cancelled about 80 per cent of its contracts for drugs and chemicals. Its inventories are sufficient for occupation armies and hospitals. Buying of atabrine and sulfa drugs has virtually stopped, but it will continue to take penicillin and streptomycin.

Importation of Formosa camphor can be expected soon. Brazilian menthol is still declining in price, although the level is higher than Chinese and Japanese prices before the war. The prices of quinine and its derivatives have advanced, while benzaldehyde declined. Lower prices were also noted for cinnamic aldehyde and pentaerythritol. The latter is in good supply because of munitions cancellations. Movement of tartaric acid is sluggish while consumers wait for citric acid. DDT demand continues high despite lateness of the season. Wholesalers are apparently building up stocks for next year. A 10 per cent price decline was noted. Inventories of glycerin are expected to rise with the curtailment of the rocket powder program, which took about 3.5 million pounds per month.

**Coal Tar Chemicals.**—Benzene, toluene and xylene are in much better supply because of reduced ordnance and aviation fuel demands. The supply of phthalic anhydride is also improving, but coal tar acids and creosote oil are still short. Lifting of controls on coal tar raw materials will undoubtedly lead to increased output of aromatics such as benzyl compounds.

ectants will be increasingly used in the postwar period. Both the "old standby" materials and new synthetics and organics will share in the expansion. This is the consensus of Federal and State authorities who have contributed their views to the *AIF News*, organ of the Agricultural Insecticide & Fungicide Association.

An opinion on market trends was offered by S. A. Rohwer, U. S. Department of Agriculture:

Development of new materials will, without doubt, have an effect on the uses of some of our standard products. That any of the standard materials will go into discard in the immediate future seems to be very unlikely. Rotenone insecticides, pyrethrum insecticides for agricultural use, and some of the forms of nicotine insecticides are still relatively new materials, but with their development there has been no reduction in the production and use of older materials such as lead arsenate and calcium arsenate.

This means that the potential market for the older materials had not been reached. I doubt if it has been reached even yet. There still will be a demand and market for these old standards. For how long and at what levels it is difficult to forecast. The inorganic insecticides of this class may be the ones which do not have as bright a future as do those of biological origin or other organic materials, but I don't think the inorganic insecticides will go out of the picture tomorrow.

Even with the immediate prewar peak consumption of rotenone insecticides, there were many uses for them that were in their infancy. The emphasis on rotenone insecticides during the past lean years of supply has not reduced the popularity they had. As imports increase and supplies become plentiful, it would seem that rotenone insecticides will find a ready market. The situation in respect to pyrethrum insecticides and nicotine materials is, I believe, very similar.

The impact that the new materials, including DDT, may have on all the currently standard insecticides will be an interesting development. It cannot yet be appraised very accurately. It is my opinion, however, that the impact of the new insecticides may be much slower in reducing the use of standard materials than some may think, and considerably further in the future than some proponents of the new materials suggest.

The new materials are, however, going to help set higher standards of performance, and thus it may be expected that they will contribute toward reducing the number of insecticides that are close to or below the threshold of effective performances.

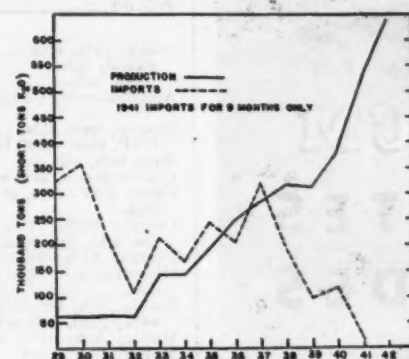
## U. S. Has Large Potash Reserves

The present position of the United States in the potash trade is the re-

verse of that held at the start of World War I. In 1941 this country was wholly dependent on imports for its supplies of this essential material, while during the present war our potash mines not only have provided for our greatly increased needs but have been a source for Canada and other of the Allied Nations.

The production of  $K_2O$  rose from 312,201 tons in 1939 to 834,568 in 1944, an increase of 168 per cent in the 5 years. Whether this greatly increased production should be maintained in peacetime or our potash resources conserved is a problem yet to be solved. As a postwar supplier in world markets, the United States would have the advantage of possessing deposits which, in average potash content, exceed those of the principal European sources.

Some potash was mined in this country during World War I, but most of the mines stopped producing when imports



were resumed from Germany. But 4 years later the turning point was reached when oil-drilling operations uncovered immense potash deposits near Carlsbad. This discovery was destined to reverse the entire supply position in this country. The newly found deposits were first mined in 1931, but even with mounting domestic production, a large part of the potash used for fertilizer continued to be imported. In 1938 we imported 187,000 tons of  $K_2O$ , although output here had risen to 317,000 tons.

Estimates place New Mexico's reserves at 75,000,000 tons of  $K_2O$ . Three mines in the Carlsbad region now produce 85 per cent of our total yearly output, which is expected to reach approximately 880,000 tons in 1945, valued at about \$22,000,000. Other known sources include the potassium-bearing brines of Searles Lake in California, and Utah's deposits in Great Salt Lake Desert and elsewhere.

## Postwar Outlook for Carbon Black

From a long range view, many conditions that will influence the demand for carbon black during the 5 years following the war are not predictable. An appraisal of the rapid developments of the past 2 years may serve as the basis for a speculative analysis with some merit.

The annual world absorption of crude

rubber in the period 1936-40 averaged almost 1.1 million long tons, of which the United States took 60 per cent in 1940. Sales of carbon black in this period by United States manufacturers, to rubber companies and for export, averaged approximately 415 pounds per ton of rubber absorbed. As recent practice has been to add more carbon black per ton of natural rubber compounded, an average of 460 pounds per ton (the 1939-40 experience) is considered more representative of present and prospective conditions.

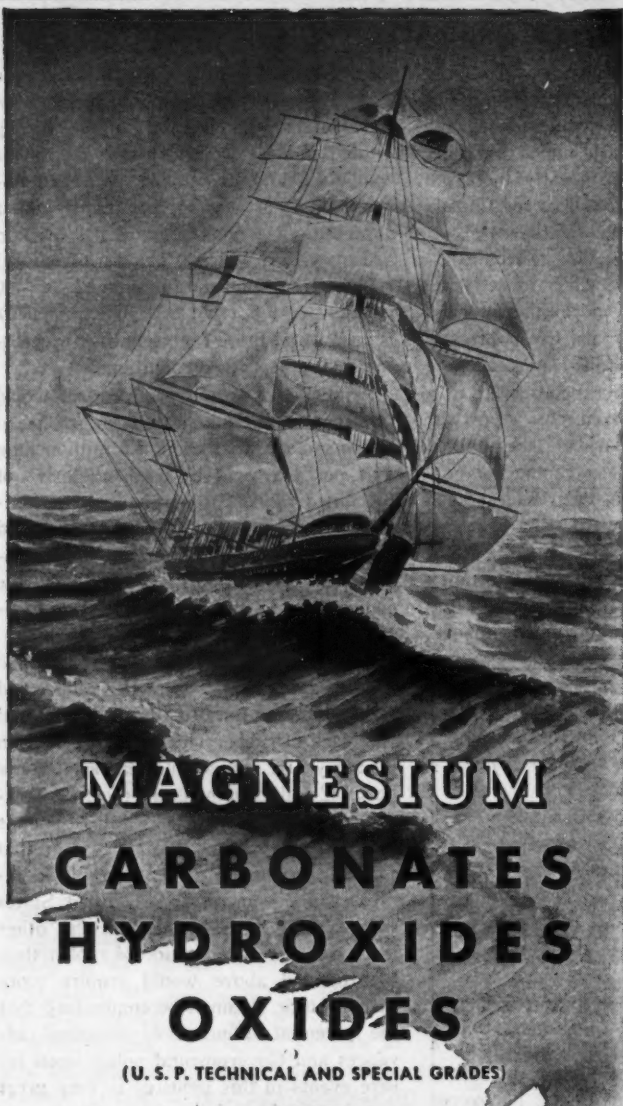
A number of estimates of postwar world rubber consumption have been published which indicate that about 1.5 million long tons per year will be used, exclusive of reclaimed rubber. This quantity approximates a projection of the long term trend in rubber consumption, and therefore assumes a continuation of growth at a rate comparable to the average in the 1925-1940 period.

With the use of 950 pounds of carbon black per long ton of synthetic rubber and 460 pounds per ton of natural, the demand for black in rubber (including 100 million pounds yearly for use in reclaimed) would be 1,182 million pounds in the first postwar year and average 1,084 million pounds in the 5-year period. To the extent that foreign production of carbon black increases, the demand from United States sources will be lessened. On the other hand, a larger consumption of rubber than is projected above would require more carbon black. It must be emphasized that the potential influence of technical advances and Governmental policy upon future events in this industry is very great and inscrutable. The above figures result from an attempt to reconcile probabilities that appear to be logical.

It is estimated that consumption of carbon black for purposes other than rubber compounding will average 56 million pounds per year trending upward from about 52 million in the first postwar year.

An average annual consumption of carbon black for all purposes of 1,140 million pounds is thus indicated for the 5 years succeeding the war, about 1,234 million pounds being needed in the first year and smaller amounts thereafter as more natural rubber enters the trade.

Information currently available indicates that the return to large use of natural rubber will increase the demand for channel black, although its fields of application may be narrowed (as compared with the prewar period) by the availability of suitable furnace blacks at competitive costs. Higher future costs for gas at channel plants, which appear to be in prospect, could operate to the competitive disadvantage of those plants because of the low-product yields. The principal furnace grades may therefore have the advantage of lower unit production costs which would encourage their substitution for channel blacks, on a price basis, for many purposes for which the two are interchangeable.



# MAGNESIUM CARBONATES HYDROXIDES OXIDES

(U. S. P. TECHNICAL AND SPECIAL GRADES)

TRADEMARK



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ORIGINAL PRODUCERS OF  
MAGNESIUM SALTS FROM SEA WATER

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## CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—\$1.00  
September, 1943, \$0.902 September, 1944, \$0.883  
September, 1945, \$0.871

	1945		1944		1943	
	Low	High	Low	High	Low	High
Acetaldehyde, 99%, drs. wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs. lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. lb.	.06	.07	.07		.07	

### ACIDS

Acetic, 28%, bbls. 100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. 100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tk. wks. 100 lbs.	6.93	7.25	6.93	7.25		6.93
Acetylsalicylic, Standard USP						
lb.	.40	.54	.40	.54	.40	.54
Benzoin, tech. bbls. lb.	.43	.47	.39	.47	.39	.47
USP, bbls, 4,000 lbs. up lb.		.54		.54		.54
Boric tech, bbls, c-l. tons	109.00		109.00		109.00	
Chlorosulfonic, drs, wks. lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. lb.	.20	.21	.20	.21	.20	.24
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.83	.81	.83	.81	.83
Formic, 85%-90% chys. lb.	.10	.11½	.10	.11½	.10½	.11½
Hydrofluoric, 30% rubber, dms. lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs lb.	.25	.26	.25	.26	.25	.26
Muriatic, 18° chys. 100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° chys, c-l, wks. 100 lb.		1.75		1.75		1.75
22° chys, c-l, wks. 100 lb.		2.25		2.25		2.25
Nitric, 36° chys, wks 100 lbs. c	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, chys, wks 100 lbs. c		5.50		5.50		5.50
40°, c-l, chys, wks 100 lbs. c		6.00		6.00		6.00
42°, c-l, chys, wks 100 lbs. c		6.50		6.50		6.50
Oxalic, bbls, wks lb.	.11½	.12½	.11½	.12½	.11½	.12½
Phosphoric, 100 lb. chys, USP lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic, tech, bbls lb.	.26	.42	.26	.42	.26	.44
Sulfuric, 60°, tks, wks ton		13.00		13.00		13.00
66°, tks, wks ton		16.50		16.50		16.50
Fuming 20% tks, wks ton		19.50		19.50		19.50
Tartaric, USP, bbls lb.	.70½	.71	.70½	.71		.70½

Alcohol, Amyl (from Pentane) tks, delv lb.		.131		.131		.141
Butyl, normal, syn, tks lb.		.10¾		.10¾	.10¾	.14¾
Denatured, CD 14, c-l drs gal. d		.57		.57		.54½
Denatured, SD, No. 1, tks. d		.50		.50		.50
Ethyl, 190 proof tks gal.		17.60		17.60		11.90
Isobutyl, ref'd, drs lb.		.086		.086		.086
Isopropyl ref'd, 91%, dms gal.	.38	.41	.37½	.66½	.39	.66½
Alum, ammonia, lump, bbls, wks 100 lb.		4.25		4.25		4.25
Aluminum, 98-99% 100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.08	.12	.08	.12
Hydrate, light, bgs. lb.		.14½		.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l 100 lb.	1.15	1.25	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks 100 lb.	1.85	2.10	1.85	2.50	1.75	2.50
Ammonia anhyd, cyl lb.		.14½		.14½		.16
Ammonium Carbonate, USP, lumps, dms lb.	.08½	.09½	.08½	.09½	.08½	.09½
Chloride, whi, bbls, wks, 100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bgs, wks. lb.	.0435	.0850	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. lb.		.23		.33		.33
Perchlorate, kgs lb.		.55		.65		.65
Phosphate, dibasic tech. bgs lb.	.07	.07½	.07	.07½	.07½	.08½
Stearate, anhyd. dms. lb.		.34		.34		.34
Sulfate, dms, bulk ton	28.20	29.20	28.20	29.20	28.20	30.00
Amyl Acetate (from pentane) c-l, drs, delv lb.		.15½		.15½		.15½
Aniline Oil, drs lb.	.11½	.12½	.11½	.12½	.11½	.12½
Anthraquinone, sub, bbls. lb.		.70		.70		.70
Antimony Oxide, bgs lb.	.15	.16	.15	.15½	.15	.15½
Arsenic, whi, kgs—powd. lb.	.04	.04¾	.04	.04¾	.04	.04¾

USP \$25 higher: Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½¢ higher than NYC prices; y Price given is per gal; c Yellow grades 25¢ per 100 lbs less in each case; d Prices given are Eastern schedule, a Powdered boric acid \$5 a ton higher; b Powdered citric acid is ½¢ higher.

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Benzalde  
Benzene  
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Benzyl  
Beta-Na  
wks  
Bismuth  
Blanc F  
bbls, v  
Bleaching  
Borax, t  
Bordeau  
Bromine  
Butyl, a  
Cadmium  
Calcium  
Carbic  
Carbon  
Carbon  
Dioxie  
Tetra  
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Liq, d  
Chlorofo  
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# Current Prices

## Barium Gums

	1945		1944		1943	
	Low	High	Low	High	Low	High
Barium Carbonate precip, wks, bgs. .... ton	60.00	75.00	55.00	75.00	55.00	65.00
Chloride, tech, cyst, bgs, zone 1 .... ton	73.00	78.00	73.00	90.00	77.00	90.00
Barytes, floated, bbls. .... ton		36.00		36.00		36.00
Bauxite, bulk mines. .... ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde, tech, clys, dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd .... gal.		.15		.15		.15
Benzyl Chloride, clys lb.	.22	.24	.22	.28	.22	.25
Beta-Naphthol, tech, bbls, wks .... ton	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots lb.		1.25		1.25		1.25
Blanc Fixe, 66 2/3% Pulp, bbls, wks .... ton	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.60	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs .... ton		45.00		45.00		45.00
Bordeaux Mixture, drs lb.	.11	.11 1/4	.11	.11 1/4	.11	.11 1/4
Bromine, cases .... lb.	.21	.23	.21	.30	.25	.30
Butyl, acetate, norm. drs. lb.	.1860	.1910	.1755	.1945	.1575	.1840
Cadmium Metal .... lb.	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs, 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs .... ton	50.00	90.00	50.00	95.00	50.00	95.00
Carbonate, c-l bgs .... ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l, ton	18.00	34.50	18.00	34.50	18.00	31.50
Gluconate, U.S.P., drs. lb.	.57	.59	.57	.59	.57	.58
Phosphate, tri, bbls, c-l lb.		.0635	.0635	.0785	.0635	.0785
Camphor, U.S.P., gran, powd, bbls .... lb.	.69	.71	.68 1/4	.71	.68 1/4	.70 1/4
Carbon Bisulfide, 55-gal drs lb.	.05	.05 3/4	.05	.05 3/4	.05	.05 3/4
Dioxide, cyl .... lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52 1/2 gal. drms .... lb.	.73	.80	.73	.80	.73	.80
Casein, Acid Precip, bgs, 100 or more .... lb.	.22	.24		.24		.24
Chlorine, clys, lcl, wks, contract .... lb.		.07 1/4		.07 1/4		.07 1/4
clys, c-l, contract .... lb. f		.05 1/4		.05 1/4		.05 1/4
Liq, tk, wks, contract 100 lb.		1.75		1.75		1.75
Chloroform, tech, drs .... lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude .... bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl .... lb.		.83 3/4		.83 3/4		.83 3/4
Oxide, black kgs .... lb.		1.84		1.84		1.84
Copper, metal .... 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54% bbls. lb.	.19 1/4	.20 1/4	.19 1/4	.20 1/4	.19 1/4	.20 1/4
Sulfate, bgs, wks cryst. .... 100 lb.	5.00	5.50	5.00	5.50	5.00	5.50
Copperas, bulk, c-l, wks .... ton		14.00		14.00		14.00
Cresol, USP, drs .... lb.	.10 3/4	.11 3/4	.10 3/4	.11 3/4	.10 3/4	.11 3/4
Cyanamid, bgs .... ton	1.52 1/2	1.62 1/2	1.52 1/2	1.62 1/2	1.52 1/2	1.62 1/2
Dibutylamine, c-l, drs, wks, .... lb.		.66		.66		.66
Dibutylphthalate, drs .... lb.	.1880	.2359	.1780	.2659	.2060	.2300
Diethylaniline, lb drs .... lb.		.40		.40		.40
Diethyleneglycol, drs, wks lb.	.14	.15	.14	.15 1/2	.14	.15 1/2
Dimethylaniline, dms, c-l, lcl lb.	.21	.22	.21	.24	.23	.24
Dimethyl phthalate, drs .... lb.	.1875	.1925	.1875	.1925	.1875	.2050
Dinitrobenzene, bbls .... lb.		.18		.18		.18
Dinitrochlorobenzene, dms lb.		.14		.14 *		.14
Dinitrophenol, bbls .... lb.		.22		.22		.22
Dinitrotoluene, dms .... lb.		.18		.18		.18
Diphenyl, bbls lcl, wks .... lb.	.16	.20	.16	.20	.15	.20
Diphenylamine bbls .... lb.		.25		.25		.25
Diphenylguanidine, drs .... lb.	.35	.37		.35	.35	.37
Ethyl Acetate, tks, firt all'd lb.	.1070	.1175	.1070	.1175	.107	.110
Chloride, drs .... lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl, wks, E. Rockies, dms .... lb.	.0842	.0941	.0842	.0941		.0842
Glycol, dms, c-l .... lb.		.10		.10		.10
Fluorspar, No. 1, grd. 95-98% bulk, c-l-mines .... ton		37.00		37.00		37.00
Formaldehyde, bbls, c-l & lcl .... lb.	.0520	.0570	.0520	.0570	.0550	.0575
Furfural tech, dms, c-l, wks lb.		.13		.13		.12 1/2
Fusel Oil, ref'd, dms, divd lb.	.18 1/2	.19 1/2	.18 1/2	.19 1/2	.18 1/2	.19 1/2
Glauber's Salt, Cryst, c-l, bgs, bbls, wks .... 100 lb.	1.05	1.45	1.05	1.25	1.05	1.25
Glycerin dynamite, dms, c-l, lb.		.16 1/2		.14 1/2		.18 3/4
Crude Saponification, 80% to refiners tks .... lbs.		.11 1/2		.09 1/2		.12 3/4

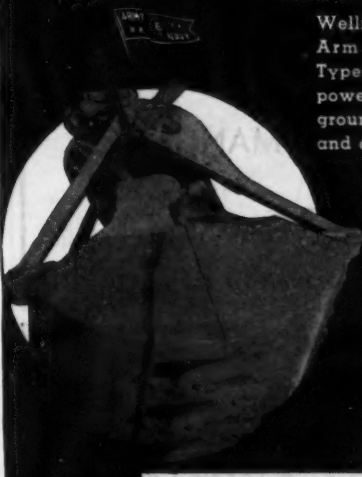
## GUMS

Gum Arabic, amber sorts bgs lb.	.12	.12 1/4	.11 3/4	.14	.13 1/2	.17 1/2
Benzoin Sumatra, CS .... lb.	.52	1.00	.52	1.00	.52	1.00
Copal, Congo .... lb.		.55 3/4		.55 3/4		.55 3/4
Copal, East India, chips .... lb.		.53 1/4				
Macassar dust .... lb.		.07 3/4		.07 3/4		.11 3/4
Copal Manila, .... lb.	.13 1/2	.15 1/2	.13 1/2	.15 1/2	.13 1/2	.15 1/2
Copal Pontianak, bold c-l lb.		.23 3/4		.23 3/4		.23 3/4
Karaya, bbls, bxs, dms. .... lb.	.15	.46	.15	.46	.14	.40

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, clys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; renef, ref'd; tanks, tks; works, f.o.b., wks.  
\* Price given is per gal.

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DEPT. H-10

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# GUMS

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BRANCHES IN PRINCIPAL CITIES

## Current Prices

Gums  
Salt Cake

	1945		1944		1943	
	Low	High	Low	High	Low	High
Kauri, N. Y.						
Superior Pale XXX lb.		.65¾		.65¾		.65¾
No. 3 lb.		.22		.23		.22
Sandarac, cs lb.		.99¾		.99¾	1.40	nom.
Tragacanth, No. 1, cases lb.	4.00	4.10	4.00	5.25	4.00	5.25
No. 3 lb.	2.25	2.50	1.10	3.50	1.10	1.20
Yacca, bgs lb.		.06	.07¾	.06	.07¾	.06
Hydrogen Peroxide, chys lb.	.15¾	.18¾	.15¾	.18¾	.15¾	.18¾
Iodine, Resublimed, jars lb.	2.00	2.10	2.00	2.10	2.00	2.10
Lead Acetate, cryst, bbls lb.		.12¾		.12¾		.12¾
Arsenate basic, bg, lcl lb.	.11¾	.12	.11¾	.12	.11¾	.12
Nitrate, bbls lb.		.12¾		.12¾		.12¾
Red, dry, 95% PbO <sub>4</sub> bbls lb.	.09	.10¾	.09	.11	.09	.11
97% PbO <sub>4</sub> , bbls delv lb.	.09¾	.11	.09¾	.11	.09¾	.11
98% PbO <sub>4</sub> , bbls delv lb.	.09¾	.11¾	.09¾	.11¾	.09¾	.11¾
White, bbls lb.	.08¾	.08¾	.08¾	.08¾	.08¾	.08¾
Basic sulfate, bbls, lcl lb.	.07¾	.08	.07¾	.08	.07¾	.08
Lime, Chem., wks, bulk ton	6.25	13.00	6.25	13.00	6.25	13.00
Hydrated, f.o.b. wks ton	8.50	16.00	8.50	16.00	8.50	16.00
Litharge, coml, delv, bbls lb.	.08	.09¾	.08	.09¾	.08	.09¾
Lithopone, ordi., bgs lb.	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾
Magnesium Carb, tech, wks lb.	.06¾	.09¾	.06¾	.09¾	.06¾	.09¾
Chloride flake, bbls, wks c-l ton		32.00		32.00		32.00
Manganese, Chloride, Anhyd. bbls lb.	.15	.18	.15	.18	.14	nom.
Dioxide, Caucasian bgs, lcl ton	4.75	79.75		74.75		74.75
Methanol, pure, nat, drs gal l	.63	.76	.63	.76	.63	.76
Synth, drs cl gal m	.31	.38	.31	.40¾	.34¾	.40¾
Methyl Acetate, tech tks lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv lb.	.09¾	.10¾	.09¾	.10¾	.09¾	.10¾
Chloride, cyl lb.	.32	.40	.32	.40	.31	.40
Ethyl Ketone, tks, frt all'd gal		.08		.08		.08
Naphtha, Solvent, tks gal		.27		.27		.27
Naphthalene, crude, 74°, wks tks lb.		.0275		.0275		.0275
Nickel Salt, bbls, NY lb.	.13	.13¾	.13	.13¾	.13	.13¾
Nitre Cake, blk ton		16.00		16.00		16.00
Nitrobenzene, drs, wks lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls lb.		.70		.70		.70
Orthochlorophenol, drs lb.	.25	.27	.25	.32		.32
Orthodichlorobenzene, drms lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks lb.		.15		.18		.18
Orthonitrotoluene, wks, drms lb.		.09		.09		.09
Paraldehyde, 98%, wks lcl lb.		.12		.12		.12
Chlorophenol, drs lb.	.26¾	.28	.25	.32		.32
Dichlorobenzene, wks lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks lb.	.21	.22	.23	.24	.23	.24
Nitroaniline, wks, kgs lb.	.43	.45	.43	.45	.43	.45
Nitrochlorobenzene, wks lb.		.15		.15		.15
Toluenesulfonamide, bbls lb.		.70		.70		.70
Toluidine, bls, wks lb.		.48		.48		.48
Penicillin, ampules per 100,000 units		.70	.95	4.50		
Pentaerythritol, tech lb.	.27	.33	.29	.33	.29	.35¾
PETROLEUM SOLVENTS AND DILUENTS						
Lacquer diluents, tks, East Coast gal		.11¾		.11¾		.11
Naphtha, V.M.P., East tks, wks gal		.11		.11		.11
Rubber solvents, East, tks, wks gal		.11		.11		.11
Stoddard Solvents, East, tks, wks gal		.10		.10		.09¾
Phenol, U.S.P., drs lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.13¾
Phthalic Anhydride, cl and lcl, wks lb.	.13	.14	.13	.14	.13	.15¾
Potash, Caustics, 88-92%, wks, sol lb.	.06¾	.06¾	.06¾	.06¾	.06¾	.06¾
flake, 88-92% lb.	.07	.07¾	.07	.07¾	.07	.07¾
liquid, 45% basis, tks lb.		.02¾		.02¾		.0275
dms, wks lb.	.03¾	.03¾	.03	.03¾	.03	.03¾
Carbonate, hydrated 83-85% lb.		.05¾		.05¾		.05¾
Chlorate crys, bgs, wks lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks lb.		.55		.55		.55
Iodide, bot., or cans lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, dom, 60-62-63% K <sub>2</sub> O bulk unit ton		.53¾		.53¾		.56
Permanganate, USP, wks dms lb.	.20¾	.21	.20¾	.21	.20¾	.21
Sulfate, 90%, basis, bgs t'n lb.		36.25		36.25		36.25
Pronane, group 3, tks gal	.45	.03¾	.45	.03¾	.45	.03¾
Pyrindine, ref., drms lb.	.45	.45¾	.45	.46	.45¾	.46
R S-It. 250 lb bbls, wks lb.		.65		.65		.65
Resorcinol, tech, drms, wks lb.	.64	.75	.68	.75	.68	.75
Rochelle Salt, cryst lb.	.43¾	.47	.43¾	.47	.43¾	.47
Salt Cake, dom, blk wks ton		15.00		15.00		15.00

/ Producers of natural methanol divided into two groups and prices vary for these two divisions; m Country is divided in 4 zones, prices varying by zone.

\* Spot price is ¼¢ higher.

# Current Prices

## Oils & Fats Saltpetre

	1945		1944		1943	
	Low	High	Low	High	Low	High
Saltpetre, grn, bbls...100 lb.	8.20	8.60	8.20	8.60	8.20	8.60
Sheliac, Bone dry, bbls. lb. r	.42½	.46	.42½	.46	.42½	.46
Silver Nitrate, 100 oz, bota						
oz.		.32½		.32½		.32½
Soda Ash, 58% dense, bgs,						
c-l, wks...100 lb.		1.15		1.15		1.15
58% light, bgs cl...100 lb.	1.05	1.13	1.05	1.13		1.13
Caustic, 76% flake						
drms, cl...100 lb.		2.70		2.70		2.70
76% solid, drms,cl 100 lb.		2.30		2.30		2.30
Liquid, 47-49%, sellers						
tkas...100 lb.		1.95		1.95		1.95
Sodium Acetate, anhyd.						
dms...100 lb.	.08½	.10	.05	.10	.05	.06
Benzoate, USP dms...lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs, cl,						
works...100 lb.	1.55	1.90	1.55	2.05		
Bichromate, bgs, wks l.c.l. lb.	.07½	.08½	.07½	.08½		.07½
Bisulfite powd, bbls, wks						
100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks...100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l. lb.		.06½		.06½		.06½
Cyanide, 96-98%, wks lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07½	.08½	.07½	.08½	.07½	.08½
Hyposulfite, cryst, bgs, cl,						
wks...100 lb.		2.25		2.25		2.25
Metasilicate, gran, bbl, wks						
c-l...100 lb.		2.50		2.50		2.50
Nitrate, imp, bgs...ton		33.00		33.00		33.00
Nitrite, 96-98% bbl. cl. lb.		.06½		.06½		.06½
Phosphate, di anhyd. bgs,						
wks...100 lb.	6.00	7.25	6.00	7.25	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.40	2.70	3.40	2.70	3.45
Prussiate, yel, bbls, wks lb.		.11	.10	.11	.10	.11
Silicate, 52° drs, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40° drs, wks, c-l 100 lb.		.80		.80		.80
Silicofluoride, bbls NY lb.	.06½	.10	.06½	.12	.05	.12
Sulfate tech. Anhyd. bgs						
100 lb.	1.70	2.20	1.70	1.90	1.70	1.90
Sulfide, cryst c-l, bbls, wks						
100 lb.		2.40		2.40		2.40
Solid, bbls, wks...lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs						
100 lb.		4.08		4.08		3.47
Potato, bgs, cl...lb.		.0637		.0637		.0637
Rice, bgs...lb.		no stocks		no stocks	.09½	.10½
Sweet Potato, bgs...lb.	.09	.09½	.07½	.09½		.07½
Sulfur, crude, mines...ton		16.00		16.00		16.00
Flour, USP, precip, bbls,						
kgs...lb.	.18	.30	.18	.30	.18	.30
Roll, bbls...100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.08½	.07	.09	.07	.08
tkas, wks...lb.		.04	.04	.06	.04	.06
Talc, crude, c-l, NY...ton		13.00		13.00		13.00
Ref'd, c-l, NY...ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks...lb.		no stocks		no stocks		no stocks
Metal...lb.		.52		.52		.52
Toluol, drs, wks...gal.		.33		.34½		.33
tkas, frt all'd...gal.		.28		.28		.28
Tributyl Phosphate, dms lcl,						
frt all'd...lb.		.49		.49		.47
Trichlorethylene, dms, wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks...lb.		.24		.24		.26
Triethylene glycol, dms...lb.	.18½	.19½	.18½	.26		.26
Triphenyl Phos. bbls...lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases...lb.		.12		.12		.12
Wax, Bayberry, bgs...lb.		no stocks	.25	nom.	.25	.26
Bees, bleached, cakes...lb.		.60		.60		.60
Candelilla, bgs crude ton	.35	.38	.34½	.48	.38	.48
Carnauba, No. 1, yellow,						
bgs, ton...lb.		.83½		.83½		.83½
Xylol, Indus. frt all'd, tks,						
wks...gal.		.27		.27		.27
Zinc Chloride tech fused, wks						
lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer. bgs, wks lb.	.07½	.07½	.07	.07½	.07	.07½
Sulfate, crys, bgs...100 lb.	3.40	4.15	3.40	4.35	3.60	4.35



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Babassu, tks, futures...lb.	.111	.111	.111	.111
Castor, No. 3, bbls...lb.	.13½	.14½	.13½	.14½
China Wood, drs, spot NY lb.	.39	.41	.39	.41
Coconut, edible, drs NY lb.	.0985	.0985	.0985	.0985
Cod Newfoundland, dms, gal.	.85	.85	.90	.90
Corn, crude, tks, wks...lb.	.12¾	.12¾	.12¾	.12¾
Linseed, Raw, dms, c-l lb.	.1550	.1510	.1560	.1530
Menhaden, tks...lb.	.1225	.1225	.1225	.1225
Light, pressed, drs l.c.l. lb.	.1300	.1300	.1305	.1307
Palm, Niger, dms...lb.	.0865	.0865	.0865	.0865
Peanut, crude, tks, f.o.b. wks				
lb.	.12¾	.13¾	.12¾	.13¾
Perilla, crude dms, NY...lb.		no stocks	.245	.245
Rapeseed, New Orleans,				
bulks...lb.	.1156½	.1156½	.1156½	.1150
Red, dms...lb.	.13½	.14½	.13½	.14½
Soy Bean, crude, tks, wks lb.	.1175	.1175	.1175	.1175
Tallow, acidless, bbls...lb.	.14½	.14½	.14½	.14½

\* Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 2c; Philadelphia deliveries f.o.b. N. Y., refined 6c higher in each case.

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**444 MADISON AVENUE, NEW YORK 22, N. Y.**

## News of the Month

(Continued from page 705)

EDWARD G. CRUM, plant manager of the Hercules Powder Co.'s Parlin, N. J., cellulose products plant, has been named to succeed John J. B. Fulenwider as assistant general manager of the cellulose products department in Wilmington, Del. Mr. Fulenwider becomes department manager.

JAMES CREESE, vice-president of Stevens Institute of Technology since 1928, has been elected president of Drexel Institute of Technology, Philadelphia, Pa. He succeeds George P. Reed, who resigned about a year ago.

Diamond Alkali Company has announced the appointment of B. H. HUFFMAN as Supervisor of Pittsburgh district sales. Associated with him will be Messrs. D. G. Hood and D. W. POWELL as sales representatives in Pittsburgh and the tri-state district.

T. H. PAASKE has been appointed divisional sales manager at St. Louis for Standard Laboratories, Inc., subsidiary of William R. Warner & Co. R. S. DANVERS has been named assistant advertising and sales promotion manager.

C. LEWIS WRENSHALL has resigned his position as assistant technical superintendent, E. I. du Pont de Nemours & Company, Alabama Ordnance Works, to accept a position on the staff of Southern Research Institute, Birmingham, Alabama. Before coming to Alabama, Dr. Wrenshall was assistant professor of agricultural chemistry, McGill University.

### Company Notes

THE GOODYEAR TIRE & RUBBER Co. has announced plans for the construction of a vinyl plastics plant at Niagara Falls, N. Y., for the manufacture of transparent packaging film, wire insulation, fabric coatings, and adhesives. Erection of the plant was scheduled for mid-August. Current production capacity is expected to be 3,000,000 pounds per year.

THE AMERSIL COMPANY, INC., of Hillsdale, N. J., who has recently become a member of Engelhard Industries, exchanging technical data and ideas with the other members of the group, has initiated a definite research program, devoted to the improving of silica and quartz products.

THE DOW CHEMICAL Co. has leased a portion of the Defense Plant Corp. plant at Ludington, Mich., for the production of lime and magnesium chloride.

GENERAL CHEMICAL Co. has announced construction has started on an aluminum sulphate plant at Savannah, Ga., to serve paper makers in that area.

# The Chemical MARKET PLACE

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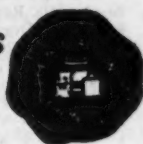
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Raymond 5 Roll Low Side Mill  
2—18" Troughing Belt Conveyors, 100 and  
200 ft. centers  
2—6' x 60" Rotary Dryers or Kilns  
5—Rotary Dryer, 6' x 45', 3 1/2' x 16', 3' x  
16', 4' x 20"  
6—Horizontal Digesters, 6' dia. x 12' long,  
with agitators  
2—Kelly #450 Filters  
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13—40" x 43" shelves.
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Presses, closed delivery, 18 to 50 cham-  
bers
  - 2—Stokes Rotary Vacuum Dryers, 1'6" x  
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  - 1—Baker Perkins 100 gal. Steam Jacketed  
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  - 1—Abbe Jacketed Ball Mill, 50 gal.
  - 6—Oliver 8' x 6' Stainless Steel Rotary  
Filters. NEW.
  - 1—Oliver Robison Top Feed Ni-Resist  
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  - 3—Rotex Triple Deck Sifters, 40" x 84",  
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  - 1—Sweetland No. 2 Filter
  - 5—Copper Vacuum Pans, 30", 42", 5', 7'  
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  - 2—Colton Automatic Tube Filling and  
Closing Machines
  - 1—Blaw Knox 5' x 7' Jacketed Ball Mill
  - 2—Promulsion Mills, stainless steel, 3 HP  
motors
  - 1—Lancaster 30" Batch Mixer
  - 1—125 gal. Aluminum Jktd. Kettle
  - 1—Filler Machine Co. 6 spout Filler
  - 3—Kiefer No. 3 Visco Fillers
  - 1—Atmos. Truck Dryer, 33' long, aero-fin  
coils, 19 trucks
  - 5—Double Arm Mixers, 10 to 100 gal.
  - 12—Shriver Filter Press, 12" to 42" square,  
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  - 3—Hardinge Mills, 2' x 8", 4 1/2' x 16",  
4 1/2' x 24"
  - 1—Jeffrey Hammer Mill, 24" x 12"
  - 3—Sharples No. 6 Centrifuges
  - 3—De Laval No. 600 Clarifiers
  - 6—Tolhurst 32", 40" Suspended Type Cen-  
trifugals
  - 3—Bufflovak Vacuum Drum Dryers, 48"  
x 40", 5' x 6'
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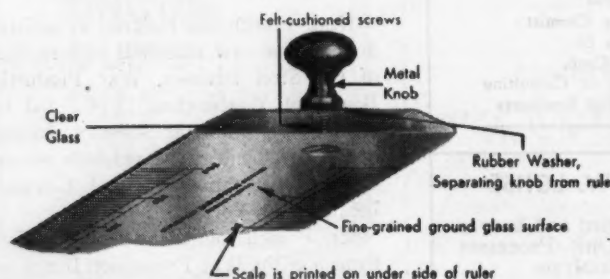
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# "WE" — EDITORIALY SPEAKING

A WRITER in an august British technical journal mentions chain, or time, reactions, in which the first compound formed enters into a new reaction to form a second compound, etc. So far so good; but we were amused, amazed, and a little baffled by his comment: "We have read about such processes, but have never taken part in arranging them or witnessing them; perhaps the whole business is one of the many fables handed down from generation to generation like the unicorns, or the sirens, or the phoenix . . ."

Breathes there a chemist who has never seen a lecture demonstration of the Landolt reaction?



FROM THE same British journal we learned that, in spite of the scientific and social "progress" of the past century, the spirit of the European continent is not much changed. Rev. Sydney Smith, writing in 1823, said, "I am worn down and worn out with crusading and defending Europe and protecting mankind. . . . I am sorry for the Spaniards—I am sorry for the Greeks—I deplore the fate of the Jews; the people of the Sandwich Islands are groaning under the most detestable tyranny; Baghdad is oppressed—I do not like the present state of the Delta—Tibet is not comfortable. Am I to fight for all these people? The world is bursting with sin and sorrow. Am I to be champion of the Decalogue and to be eternally raising fleets and armies to make all men good and happy? We have just done saving Europe, and I am afraid the consequence will be that we shall cut each other's throats."

The more things change, the more they remain the same!



CANADIAN Department of Agriculture scientists and the Price Board's Insecticide Advisory Committee agree unanimously that the reported practice of spraying babies with DDT to make them flyproof is unwise.

In a similar vein, we heartily discourage the practice of dunking infants less than two months old in sheep dip.



WE ARE THE last ones in the world to scream about typographical errors, but

## Fifteen Years Ago From Our Files of Oct., 1930

*Standard Oil of New Jersey curtails operations in mechanical and electrical departments of Bayonne refinery on Saturdays instead of discharging men during slack seasons.*

*I. G. Farben announces that American oil refining company representatives are well satisfied with results of experiment made with hydrogenation process in Germany.*

*Triplex Safety Glass Co. of America begins production of laminated glass similar to non-shatterable windshield glass, for furniture and inside building use.*

*U. S. Shellac Importers' Association opens shellac standardization bureau at 21 Burling Slip, New York. Bureau will test every importation of shellac for any member of association in effort to raise quality of imported shellac.*

*Per K. Frolich is awarded Grasselli Medal for 1920 by vote of the medal committee of the American Section of the Society of Chemical Industry for his work on Synthesis under High Pressure.*

*Dr. W. D. Coolidge, associate director research laboratory, General Electric Co., develops 500,000-volt X-ray tube, more than twice as powerful as present tubes.*

*Du Pont Rayon Co. resumes operations at Waynesboro, Va., plant with about 60 per cent of normal force.*

*American Chemical Society registers vigorous protest by Division of Chemical Education against action of Governor Bilbo of Mississippi for summarily dismissing faculty members of state-supported schools.*

## Thirty Years Ago From Our Files of Oct., 1915

*Dow Chemical Co. increases capital stock from \$1,500,080 to \$3,000,000 and distributes the additional stock in the form of a stock dividend.*

*William Zinsser & Co. is incorporated in New York with capital of \$100,000.*

*Monsanto Chemical Works begins construction of a \$60,000 plant annex.*

an error in the correction of an error is something special: "Only a few errors were noticed: Avogadro's Number is now  $6.02 \times 10^{23}$  . . ."

Our slide rule is cooling off from a rapid calculation that the perpetrator of the above is off by a factor of 95,500,000,000,000,000,000, which is just about 3.86 times as bad as the average news commentator.



THE TECHNICAL manpower problem is not peculiar to our own country. England recognizes, as we do, the necessity of training men for scientific pursuits. Here is what the editorial page of *Chemistry & Industry* says about it:

For many years it has been realized in this country that an increase in scientific education and in technical education is of vital importance to us. What was in the last generation a newfangled doctrine held by a few has become universally accepted by statesmen of every degree of political faith. Although there is a little divergence of opinion as to the method of obtaining this educational progress, there is no responsible body that denies its necessity. It is highly probable that, poor as Britain is and will be, we can afford to make a considerable improvement in scientific and technical research; perhaps it would be nearer the truth to state that we cannot afford to postpone such an improvement."



THOUGH FULLY aware of our own occasional vulnerability, we can't resist the temptation to poke friendly fun once in a while at some of our eminent contemporaries, especially when the butt of our remarks happens to be that lord of publishing creation, the *Saturday Evening Post*. Sagely observes a *Post* editorial of August 25, "Other things being equal, in war, as in peace, the nation with the best laboratories wins." Why laboratories, Mr. Hibbs? Other things being equal, just an extra old mule would do the trick!



"BUILD A BETTER mousetrap and the . . ." No, we can't go on with that trite old proverb, but we can inform you that the postwar world comes equipped with an electronic mousetrap which disposes of the lesser breed, or four-legged variety, of rats. The fiendish device is set in motion when the mouse runs across an electric-eye beam, causing doors to clang shut, sparks to fly, the wee beastie to be electrocuted, and his body to be disposed of.

# PART 2: PATENTS - AND TRADEMARKS

## Abstracts of U. S. Chemical Patents

### A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 576, Nos. 2, 3, 4, 5—Vol. 577, No. 1 (July 10-August 7)—p. 597

#### \* Equipment

Reactor for liquid phase chemical reactions involving continuous conversion of fluid raw material to dispersed solid at reaction conditions. No. 2, 378,138. Peter Gaylor.

Apparatus for cutting a glass tube between ends and sealing tube at cut with a flat closure. No. 2,378,146. Walter Luerzing to E. Machlett & Son.

Liquid storage device comprising closed container formed of flexible inelastic impervious material and having a bottom wall, a top wall and cylindrical connecting side wall, etc. No. 2,378,159. James Royer to United States Rubber Co.

Liquid storage device comprising closed container formed of flexible inelastic impervious material and including a circular bottom wall and a circular top wall connected by a cylindrical side wall, etc. No. 2, 378,161. Fred Sawyer to United States Rubber Co.

Single effect evaporator for distilling a liquid, a horizontal cylindrical container, etc. No. 2,378,350. Eugene Worthen and Benjamin Fox to Buena Vista Iron Co.

Regeneratively heated coke oven formed of silica masonry. No. 2,378,387. Joseph Becker to Koppers Co., Inc.

Liquid-ejecting means and substitute closure member for sealing cap of a container, adapted for dispensing a fire-extinguishing liquid. No. 2, 378,426. David Myers.

Steam and water drum having plurality of rows of tubes for delivering steam and water mixture thereinto, some disposed to deliver into steam space of drum and some to deliver below the normal water level. No. 2,378,429. Palmer Place to Combustion Engineering Co. Inc.

Battery of horizontal coke ovens. No. 2,378,450. Joseph van Ackeren to Koppers Co. Inc.

Viscosimeter for fluid containing sediment, comprising first and second nozzle means for discharging first and second jets, respectively, etc. No. 2,378,491. Bernard McNamee to The Superior Oil Co.

Alternating current rectifier comprising base provided with layer containing selenium, selenium dioxide, a halogen salt and antimony. No. 2, 378,513. Leslie Thompson and Alexander Jenkins to The Union Switch & Signal Co.

Centrifugal dust separator. No. 2,378,600. Hermann van Tongeren.

Apparatus for fluid-type catalyst system wherein powdered catalyst effects conversion while suspended in hydrocarbon vapors in a conversion reactor, is then separated and suspended in gas for regeneration in a regenerator reactor. No. 2,378,607. George Watts to Standard Oil Co.

Means for separating solids from liquid mixtures comprising casing, partition extending diagonally across casing and dividing same into a lower inlet compartment and an outlet compartment, etc. No. 2,378,632. Charles Hooker, Jr. and Jackson Staley; said Staley to said Hooker, Jr.

Apparatus for purification of liquids. No. 2,378,737. Sandor Simkovits.

Classifier for liquid borne materials, including a generally cylindrical and generally vertically disposed open bottom chamber, means for injecting liquid into said chamber tangentially to side walls thereof, etc. No. 2,378,756. Augustus Durdin, III.

Comminuting material carried by a stream of flowing fluid which comprises causing stream to flow diametrically through a cylindrical screen from upstream face through a downstream face, etc. No. 2,378,757. Augustus Durdin, III.

Catalyst chamber construction. No. 2,378,792. Wendell Roach to Phillips Petroleum Co.

Device for determining volume of liquid in a receptacle containing a liquid and a gas which comprises means for placing receptacle under a gaseous pressure different from that in an adjacent static pressure zone, etc. No. 2,378,849. Tore Helleberg and Sven Malmstrom.

Apparatus for treating impure liquids including trickling filterbed; a sedimentation tank for quiescent settling including a partially submerged feedwell within tank, etc. No. 22,652. Douglas Reybold and Anthony Fischer to The Dorr Co.

In a mass spectrometer provided with analyzer, in which a heterogeneous mixture of ions of different specific charge are projected as a beam by an electrical potential and separated into a plurality of beams of ions, etc. No. 2,378,936. Robert Langmuir to Consolidated Engineering Corp.

Mass spectrometer having an ionization chamber, means for admitting thereto molecules to be ionized, and means for ionizing the molecules in a restricted region within the chamber by bombarding them with ionizing particles, etc. No. 2,378,962. Harold Washburn to Consolidated Engineering Corp.

Steam generator comprising a setting, a transverse steam-and-water drum in rear portion of setting, etc. No. 2,379,009. Max Kuhnner to Riley Stoker Corp.

Filter funnel fashioned of glass and including bottom wall having flat upper surface, upstanding marginal rim integral with bottom wall, etc. No. 2,379,101. Otto Post.

Centrifugal gas and liquid separator comprising a pump and electric motor unit adapted to be submerged in a liquid filled tank, etc. No. 2,379,133. Russell Curtis to Curtis Pump Co.

Pump combining action of a molecular pump with pumping effect of an entraining vapor comprising stator member, rotor member spaced from stator, etc. No. 2,379,151. Kenneth Hickman to Distillation Products, Inc.

Multi-stage vertical fractionating condensation pump adapted to employ a

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

#### Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

August 21, 1945

Pat. 1,938,790. **Spray Treating of Web Material on the Paper Machine.** Patented Dec. 12, 1933. The process of applying a water repellent coating during the manufacture of paper on a web forming machine which includes spraying such material on the web at a predetermined point while the web is passing through the machine. (Owner) Edmund P. Arpin, Jr., Neenah, Wis. Group 26—2—3. Reg. No. 178.

Pat. 2,119,851. **Safety Valve.** Patented June 7, 1938. Relieves pressure and automatically shifts the valve on its seat under predetermined conditions or at predetermined periods so as to prevent sticking without opening the valve. (Owner) Henry Cave, 138 Kenyon Street, Hartford, Conn. Group 33—61. Reg. No. 177.

Pat. 1,730,270. **Speed-Reducing Transmission.** Patented Oct. 1, 1929. Provides very high ratios; reduces frictional losses. Has two or more driven shafts for more than one stage reduction, with different ratios, running in the same or in opposite directions. Provides a speed reducing transmission which will, in one or two stages, provide all ratios commonly used in commercial practice. Is not commercially practical for ratios much below 30 to 1. (Owner) Philip A. Friedell, 1629 Telegraph Avenue, Oakland 12, Calif. Groups 35—63; 38—11—31. Reg. No. 188.

Pat. 1,932,104. **Abrasive Article and Method of Making Same.** Patented Oct. 24, 1933. For use in grinding and polishing operations, particularly the type utilizing a filler wherein incompletely polymerized synthetic rubber, otherwise known as chloroprene, is mixed with abrasive material, and thereafter polymerization continued until desired hardness is obtained. (Owner) Synthetic Rubber Abrasives, Inc., 114 Maple Avenue, Hamburg, N. Y. Group 37—91. Reg. No. 191.

Pat. 2,280,703. **Process for Granulating Metals.** Patented Apr. 21, 1942. Produces uniform, spherical, very finely divided alkali metals and their various alloys. Can be used in the production of various synthetic chemicals. Also useful to remove last traces of moisture and acid from petroleum, etc., and as a reducing or hydrogenating agent. (Owner) Russell Hart, 411 West 113th Street, Los Angeles 3, Calif. Groups 28—34—88; 35—59. Reg. No. 198.

mixed organic fluid and during operation to fractionate components thereof and deliver fractionated vapors to appropriate superimposed jet nozzles so that low vapor pressure components exert their pumping action toward low pressure side and high vapor pressure components toward high pressure side. No. 2,379,152. Kenneth Hickman to Distillation Products, Inc.

Apparatus for determining particle size characteristics of a powdered material, in combination, small storage receptacle for receiving dispersed quantity of powdered material in dispersing medium, a settling column to receive dispersing medium therein, light source and a light sensitive device to indicate relative light transmission. No. 2,379,158. Philip Kalischer to Westinghouse Electric Corp.

Operative element of electrical control system characterized by high but variable overall electrical conductivity, said element comprising sintered component of copper or silver, and bismuth component dispersed in sintered component. No. 2,379,232. Franz Hensel to F. R. Mallory & Co., Inc.

Adsorption filter plant for recovery of solvent from solvent-laden air, comprising two adsorption filter casings, bed of adsorbent material dividing each casing into first and second chambers, etc. No. 2,379,321. Edgar Sutcliffe and William Edwards to Sutcliffe, Speakman & Co. Ltd.

Heating device for conditioning a dental hydrocolloid. No. 2,379,504. Morris Thompson.

Improved jet and Venturi tube construction which ensures that ratio of any pre-determined proportion of an entrained gas shall remain constant at all rates of flow of primary gas passing through jet. No. 2,379,551. Henry Talley.

Electrical contact system for making and breaking electric current, comprising pair of cooperating electrical contacts positioned opposite each other wherein one has contact face taken from group silver and nickel,

and other has contact face of palladium. No. 2,379,641. Christian Keitel to Baker & Co. Inc.  
 High-pressure steam generator. No. 2,379,661. Leslie Sebald to The Griecom-Russell Co.  
 Apparatus for removing foreign material from air comprising upright casing having air outlet at top and having a water reservoir in its bottom portion. No. 2,379,795. Orrin Fenn to Peters-Dalton, Inc.  
 Capsulating process and apparatus. No. 2,379,816. Carl Mabbs to Gelatin Products Corp.  
 Machine for forming capsulating material. No. 2,379,831. Robert Scherer to Gelatin Products Corp.  
 Pressure filter including housing means for introducing liquid into housing, filter leaves within said housing, etc. No. 2,379,848. Walter Damme and Raymond Gabler to Butler Manufacturing Co.  
 Sifter powder box, in combination, outer tubular member having abutment portion adjacent bottom edge of inner surface of wall thereof, a box unit adapted to hold powder therein and comprising inner side wall, etc. No. 2,379,853. Joseph Smith to Wrigley Pharmaceutical Co. Inc.

### \* Explosives

Unmodified progressive-burning smokeless powder grains for use in .22 caliber rimfire ammunition comprising uniform colloid containing between 10 and 20% nitroglycerin, between 10 and 30% nitroguanidine, between 50 and 80% nitrocellulose, and a stabilizer. No. 2,379,056. Harvey Alexander to Hercules Powder Co.

### \* Food

Metal food and beverage container having lining applied directly to metal wall surface, said lining consisting of mixture of wax and mica powder. No. 2,378,521. Albin Warth and William Rainer to Crown Cork & Seal Co. Inc.  
 Concentrating citrus fruit juice to total soluble solid content between 72% and 82% which comprises extracting juice, concentrating under vacuum, during concentration introducing precipitating agent containing calcium ions. No. 2,378,533. Jorgen Dietz Bering.  
 Making dehydrated citrus material, which comprises cutting citrus fruit into pieces, treating with compound containing carbonyl radical and dehydrating resulting material. No. 2,379,068. Harold Derby to F. E. Booth Co. Inc.  
 Purifying diffusion juice from sugar beets. No. 2,379,319. Herman Schreiber.  
 Preparing wheat for milling into flour and other products, which comprises treating with dilute mixture of chlorine dioxide and chlorine in air and solution of added non-volatile inorganic water soluble alkaline substance to react with chlorine dioxide to form a chlorite. No. 2,379,335. John Baker to Novadel-Agenc Corp.  
 Manufacturing solid dehydrated coffee which comprises extracting coffee constituents of ground coffee with a corn syrup solution and dehydrating resulting coffee corn syrup mix. No. 2,379,427. Walter Fetzer to Union Starch & Refining Co.  
 Food product high in protein content and vitamins comprising, a homogeneous mixture of soy particles and granules from aleurone layers of wheat. No. 2,379,441. Arnold Kaeher.  
 Homogenized cow's milk fortified with both carotin and vitamin C, carotin content to impart a golden color to product to protect vitamin C content against catalytic action of light. No. 2,379,586. Paul Manning and Elmer Trone to Golden State Co. Ltd.

### \* Inorganic

Producing adsorbent alumina comprising drying aluminum hydroxide to a water content of 2-15 per cent by weight, and heating resulting alumina in contact with water under super-atmospheric pressure. No. 2,378,155. James Newsome and Ralph Derr to Aluminum Co. of America.  
 Producing composite inorganic oxide gel of silica and titania. No. 2,378,290. Leonard Drake and Louis Evans to Socony-Vacuum Oil Co. Inc.  
 Manufacture of alum crystals. No. 2,378,296. Arthur Fleischer to Olin Industries, Inc.  
 Producing alkaline earth metal hydrides by reacting an alkaline earth metal with hydrogen gas. No. 2,378,368. Peter Alexander to Metal Hydrides Inc.  
 Removal of cyanogen compounds from coke-oven gas, and conversion of same, without production of insoluble cyanides, to refined alkali-metal ferro-cyanide. No. 2,378,403. Herbert Gollmer and Howard Meredith to Koppers Co. Inc.  
 Making a selenium element which comprises blowing selenium powder under pressure on a heated base plate. No. 2,378,438. Otto Saslaw and Harry Carlson to Federal Telephone & Radio Corp.  
 Treating selenium-bearing slimes to convert selenium into a water-soluble form, which comprises admixing with alkali metal salt material and water to form a thick slurry, etc. No. 2,378,824. Jesse Betterton and Yuri Lebedeff to American Smelting & Refining Co.  
 Concentrating indium which comprises, heating a lead containing indium at temperature above melting point of lead with an alkali-metal sulfide. No. 2,378,848. Max Heberlein to The American Metal Co. Ltd.  
 Recovering boron fluoride in concentrated form from a gaseous mixture containing boron fluoride and other components, which comprises passing mixture into contact with a liquid sulfur compound of type R-S-R'. No. 2,378,968. William Axe to Phillips Petroleum Co.  
 Removing all sulfur dioxide associated with hydrofluoric acid as an impurity, which comprises subjecting impure hydrofluoric acid to distillation in presence of a low-boiling paraffin hydrocarbon. No. 2,379,022. Maryann Matuzak to Phillips Petroleum Co.  
 Hydrogen fluoride recovery process. No. 2,379,041. Walter Schulze and William Axe to Phillips Petroleum Co.  
 Protecting coating of luminescent material on inside of discharge-enclosing wall of electric discharge device against deterioration from effects of discharge; which comprises treating coating with solutions of strontium chloride and of sodium phosphate. No. 2,379,057. James Anderson, Robert Wells and William Scott to General Electric Co.  
 Separation and recovery of hydrogen sulphide from coke-oven gas. No. 2,379,076. Herbert Gollmer to Koppers Co. Inc.  
 Concentrating dilute sulfuric acid containing carbonaceous material in which acid is subjected to action of hot gases. No. 2,379,224. Frank Ferguson to Standard Oil Development Co.  
 Fluid aluminum chloride-containing catalyst consisting of molten mixture

of aluminum chloride and pyridine hydrochloride. No. 2,379,687. Chester Crawford and William Ross to Shell Development Co.  
 Forming a dehydrative catalyst comprising mixing base metal selected from aluminum, magnesium and zinc, to form a core, with higher oxide selected from elements of family A of sixth group of periodic system, etc. No. 2,379,736. Harry Miller to National Agrol Co. Inc.  
 Restoring weak acid of 35-50% acid concentration on hydrocarbon-free basis, obtained in process of manufacture of alcohols from olefins. No. 2,379,823. Henry Mottern to Standard Oil Development Co.  
 Removing hydrogen sulfide from gas containing, bringing gas into contact with solution of a water-soluble zinc salt of a strong acid containing suspended therein partially undissolved zinc compound. No. 2,378,689. Benjamin Collins to American Viscose Corp.  
 Catalytic conversion system. No. 2,379,027. Donald Monro to Standard Oil Co.  
 Reconstituting spent aqueous alkaline solutizer solution wherein solutizer is a salt of organic solutizer acid, said solution being contaminated with impurities including foaming and emulsifying agents. No. 2,379,098. Alan Nixon to Shell Development Co.  
 Extractive distillation process for separation of vaporizable mixture of two components comprising contacting mixture with a high boiling selective solvent for one of components in an extractive distillation column. No. 2,379,110. Mott Souders, Jr. to Shell Development Co.  
 Method of controlling fluid flow. No. 2,379,240. Prentiss Lobdell to Standard Oil Development Co.  
 Transmitting heat by means of a heat transfer fluid which comprises employing liquid ester of (a) an aliphatic polyhydric alcohol and (b) an acid ester of carbonic acid and a monohydric saturated alcohol as heat transfer fluid. No. 2,379,249. Irving Muskat to Pittsburgh Plate Glass Co.  
 Catalytic conversion system. No. 2,379,408. Maurice Arveson to Standard Oil Co.  
 Method of producing vacuums to extremely low pressures which comprises heating source of stable organic liquid to convert it into vapor phase, accelerating molecules of vapor, and causing accelerated molecules to issue as jet in aspirating relation to opening communicating with space to be evacuated. No. 2,379,436. Kenneth Hickman and George Kuipers to Distillation Products, Inc.  
 Improving flow characteristics of fine catalyst particles. No. 2,379,448. Norman Linn to Standard Oil Development Co.  
 Maintaining at constant desired temperature a conversion catalyst promoting an endothermic conversion reaction. No. 2,379,481. Arch Foster to Phillips Petroleum Co.  
 Separating condensable resin-forming unsaturated hydrocarbons from manufactured gas containing aromatic resin-forming hydrocarbon material including styrene and also containing C<sub>6</sub> diene hydrocarbon material. No. 2,379,518. Edwin Hall to The United Gas Improvement Co.  
 Distillation heat exchange method and apparatus. No. 2,379,519. Walter Hall to Arthur D. Little, Inc.  
 Introducing catalyst material into aluminum chloride hydrocarbon conversion zone operating at superatmospheric pressure and containing liquid aluminum chloride hydrocarbon complex. No. 2,379,550. Mack Sutton and Cecil Nysewander to Standard Oil Co.  
 Separation of diolefin from a gaseous hydrocarbon mixture containing a diolefin and a corresponding mono-olefin which comprises contacting with liquid solvent of acetonitrile and propionitrile to selectively dissolve diolefin. No. 2,379,696. Theodore Evans to Shell Development Co.  
 Removing gases from a hot zone in which such gases are moved upward through a dense phase consisting of a finely divided fluidized mass of solid material, then through less dense phase consisting of gases with entrained solid material, and finally out of zone at top thereof, method of preventing removal of entrained solid material with gases. No. 2,379,734. Homer Martin to Standard Oil Development Co.  
 Absorbing non-condensable gas in a liquid absorbent between 30° F. and 200° F. under pressure between 2 1000 atmospheres, subjecting fat liquid to additional pressure and chemically reacting non-condensable gases under these conditions. No. 2,379,751. Francis Russell to Standard Oil Development Co.  
 Method of forming compound drops of first and second reactable liquids and a third liquid immiscible therewith. No. 2,379,817. Carl Mabbs to Gelatin Products Corp.  
 Subjecting compact bundle of continuous filaments to contact with gas under pressure in elongated, confined zone, passing filaments and gas into a second zone having a pressure lower than first so as to obtain rapid expansion of gas and separation of filaments. No. 2,379,824. Lester Mummery to E. I. du Pont de Nemours & Co.

### \* Medicinal

Medicinal preparation consisting of mixture of sodium bicarbonate and insoluble carbonate salts selected from calcium, magnesium and bismuth. No. 2,378,147. Walter McGeorge and Francis Milner.  
 Extraction of actinomycin A and manufacture of its diacetates. No. 2,378,449. Max Tishler to Merck & Co. Inc.  
 Antimicrobial substance comprising ether-soluble concentrate, extracted from Actinomyces antibioticus culture, and composed of high molecular, water-soluble, petroleum ether insoluble component and high molecular, water-insoluble, petroleum ether-soluble component. No. 2,378,876. Selman Waksman and Harold Woodruff to Merck & Co. Inc.  
 Recovering 3,17-androstenedione from a crude preparation thereof. No. 2,378,918. Erhard Fernholz, deceased, by Mary Fernholz, administratrix, to E. R. Squibb & Sons.  
 Closing open end of a cylindrical glass tube partly filled with a pharmaceutical preparation to form a seal close to preparation therein. No. 2,379,342. Frank Cocozzi.  
 Separating one of tocopherols from a mixture of free tocopherols. No. 2,379,420. James Baxter and Charles Robeson to Distillation Products, Inc.  
 Producing elastic and roughened surgical bandage comprising treating open weave cotton fabric with solution of sodium hydroxide, etc. No. 2,379,574. Charles Goldthwait to Secretary of Agriculture of the United States of America.  
 Aqueous liver solution containing riboflavin, liver solids content being at least 200 mg. per cc. and riboflavin content in excess of water solubility of riboflavin. No. 2,379,644. Robert Shelton to The Wm. S. Merrell Co.

### \* Metallurgy, Ores

Removing metal oxide from surface of a metal article non-reactive with

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

- alkali metal hydroxides which comprises immersing in molten composition comprising alkali metal hydroxide having alkali metal hydride dissolved therein. No. 2,377,876. Harvey Gilbert to E. I. du Pont de Nemours & Co.
- Bearing comprising self-banded metal body comprising silver powder and soft, lower melting point lubricating metal interspersed. No. 2,377,882. Franz Hensel and Earl Larsen to P. R. Mallory & Co. Inc.
- Producing by cold reduction methods, plain low carbon soft steel flats containing 0.06 to 0.10 per cent carbon and 0.2 per cent silicon, which flats are free from tendencies to recover preformed position upon bending. No. 2,377,922. Frederick Campbell and Edward Robinson.
- Making furnaces for electrolytic production of aluminum provided with a sole or trough made from carbon. No. 2,378,142. Hans Hurter to Societe Anonyme pour l'Industrie de l'Aluminium.
- Heat treating ferritic steels containing alloying elements to retard thermal transformations and to bring such transformations within predetermined temperature ranges. No. 2,378,300. John Hodge to Carnegie-Illinois Steel Corp.
- Hot-reducing into strip electrical silicon steel having a carbon to silicon ratio permitting austenite to form at hot-reducing temperatures. No. 2,378,321. Matti Pakkala.
- Manufacture of alloy steel articles. No. 2,378,338. Albert Swanson to Carnegie-Illinois Steel Corp.
- Concentrating mineral containing quantities of particles of all size ranges up to maximum size of particles being treated and of high density and of lower density. No. 2,378,356. Louis Erck to Minerals Beneficiation, Inc.
- Concentrating ore containing quantities of coarse low density material associated with high density material in form of particles of all size ranges. No. 2,378,357. Louis Erck to Minerals Beneficiation, Inc.
- Production of iron-chromium alloys of appreciable nitrogen contents, which includes preparing in furnace a bath of ferrous metal containing chromium and adding briquetted nitrogen-containing material comprising ferrous ferricyanide and low carbon ferrochrome. No. 2,378,397. Alexander Feild to Rustless Iron and Steel Corp.
- Corrosion resistant, low-carbon, low-alloy high strength steel with silicon and manganese contents not in excess of those found in mild carbon steel, and being under contents required for imparting added strength to carbon steels. No. 2,378,437. Byramji Saklatwalla.
- Coating ferrous metal stock with a layer of copper, passing stock through a molten zinc galvanizing bath. No. 2,378,458. Samuel Avallone to The American Steel & Wire Co. of N. J.
- Making shaped forms of sinterable powder mixtures of hard metal alloys and like. No. 2,378,539. Walther Dawhl.
- Steel containing carbon up to 1.7%, 1.0% to .50% sulphur, and .01% to 1.0% bismuth. No. 2,378,548. James Gregg and Eric Jette to Bethlehem Steel Co.
- Froth flotation process, comprising agitating and aerating pulp of barite ore in presence of talloel, lauric-acid-ester-diethylene-glycol-ammonium-sulphate and alcohol chosen from hexanols, heptanols and octanols, in presence of a conditioner chosen from silicates of soda. No. 2,378,552. Edward Hoag.
- Cold rolling articles formed of magnesium and magnesium-base alloys. No. 2,378,679. Gerhard Ansel to The Dow Chemical Co.
- Preparing castings from metallic magnesium and magnesium-base alloys, which comprises covering exposed surfaces of metal in filled mold with protective layer consisting of mixture of loose fluffy asbestos and finely-divided sulfur. No. 2,378,699. George Gunn to The Dow Chemical Co.
- Making annular gray cast iron objects which comprises introducing into uninsulated metal mold molten iron capable of transforming into gray iron on slow cooling, rotating mold about its longitudinal axis to rapidly distribute iron in a thin layer around periphery of mold for instantaneous and simultaneous solidification throughout mold, etc. No. 2,378,723. John Nolan, Jr. to The Central Foundry Co.
- Cold-working magnesium alloy tubes to increase compressive strength thereof without materially decreasing ductility of metal. No. 2,378,729. Herbert Schmidt to The Dow Chemical Co.
- Electrolytically treating metal in bath including molten sodium compound, comprising use of a ferrous kettle for bath and inclusion of a nitrogen and oxygen containing compound having characteristic of evolving nitrogen-oxydes at anode to prevent sludges from sticking to surfaces. No. 2,378,761. Frank Forsberg to The American Steel & Wire Co. of N. J.
- Alloys consisting only of iron, manganese and chromium, free from carbon and from oxides of aluminum and silicon. No. 2,378,916. Reginald Dean to Chicago Development Co.
- Steel article produced by cold drawing, cold rolling, comprising manganese, 15.5% and 20%, nickel, 0.25% and 4.5%; and copper, 0.25% and 2.5%; remainder iron. No. 2,378,991. Russell Franks to Electro Metallurgical Co.
- Steel article for use at low temperatures, containing 15% to 20% manganese to render said steel austenitic, 0.2% to 8% of austenite-stabilizing element selected from nickel and copper, 0.01% to 0.5% carbon and remainder iron. No. 2,378,992. Russell Franks to Electro Metallurgical Co.
- Cold worked steel articles, resistant to progressive rusting, composed of manganese, 15.5% and 20%; nickel, 0.25% and 4.5%; chromium, 0.25% and 7%; remainder iron. No. 2,378,993. Russell Franks to Electro Metallurgical Co.
- Steel article produced by cold forming operations, comprising manganese, 15.5% and 20%; copper, 0.25% to 1.75%; remainder iron. No. 2,378,994. Russell Franks to Electro Metallurgical Co.
- Polishing chrome-nickel stainless iron and steel by anodic treatment comprising immersing metal in bath containing 60% to 90% by weight of concentrated sulphuric acid and remainder water. No. 2,379,066. Irvine Clingan to Rustless Iron and Steel Corp.
- Anode structure comprising body of pure electrolytic copper forming a target surface, said body having internal grain structure normal to target surface. No. 2,379,397. Michael Zunick to General Electric X-Ray Corp.
- Reducing iron oxide ores, which consists in bringing ore into contact with a reducing gas, said gas consisting of hydrogen and methane, but containing minor amounts of carbon monoxide, carbon dioxide, hydrogen sulphide and water vapor. No. 2,379,423. Arthur Cape, Herman Brasert, and Llewellyn Thomas.
- Alloy for electrolytic cells for production of magnesium metal comprising 12.4% lead, and 13.02% bismuth and 74.58% mercury. No. 2,379,429. Donald Forsgren and Waldo Forsgren to U. S. Metallic Magnesium Co.
- Bearing formed of metal composition of 2 to 35% thallium and balance all copper. No. 2,379,434. Franz Hensel to P. R. Mallory & Co. Inc.
- Bearing formed of metal composition of 1 to 34% thallium, 1 to 34% lead and balance all copper. No. 2,379,435. Franz Hensel to P. R. Mallory & Co. Inc.
- Method of avoiding blisters during heat treatment which consists in wetting aluminum forgings with a water solution containing sodium borate, drying forgings, and then heat treating in a furnace. No. 2,379,466. Kenneth Abbe.
- Wetting aluminum forgings with a water solution containing sodium fluoroborate, drying forgings, and then heat treating in a furnace, but without fusion, to give them strength. No. 2,379,467. Kenneth Abbe.
- Producing metallic magnesium from magnesium silicates. No. 2,379,576. Fritz Hansgirt to North Carolina Magnesium Development Corp.
- Electric furnace for heating and melting of light metal, comprising a furnace chamber adapted to be charged with fused salt which acts as resistor to passage of alternating current, etc. No. 2,379,651. Percy Pritchard.
- Refining cobalt ore, which comprises forming a mixture of ore with salt, soda, and nitre, and fusing same. No. 2,379,659. Robert Schaal to Ferro Enamel Corp.

## \* Organic

- Organic phosphorus abietates and process of manufacture. No. 2,377,870. Ernest Engelke to Cities Service Oil Co.
- Preparation of (beta-chloromethoxy) ethyl acetate or alpha-methyl-beta (chloromethoxy) ethyl acetate. No. 2,377,878. William Gresham to E. I. du Pont de Nemours & Co.
- Preparing methyl methacrylate monomer from polymeric methyl methacrylate. No. 2,377,952. Barnard Marks to E. I. du Pont de Nemours & Co.
- New phosphorus and sulfur-containing composition, the phosphorus sulfide-hydrocarbon reaction product reacted with a basic metallic sulfide. No. 2,377,955. Lawson Mixon and Clarence Loane to Standard Oil Co.
- Effecting rearrangement of fatty acid radicals in a triglyceride mixture by heat treatment, in presence of water and under as great vapor pressure as mixture containing water. No. 2,378,005. Eddy Eceky to The Procter & Gamble Co.
- Altering composition of a fat which comprises subjecting to a temperature at which rearrangement of glycerides will take place. No. 2,378,006. Eddy Eceky to The Procter & Gamble Co.
- Altering composition of a mixture of glycerides which comprises heating mixture of glycerides and a fatty acid ester of a monohydric aliphatic alcohol having less than five carbon atoms per molecule, etc. No. 2,378,007. Eddy Eceky to The Procter & Gamble Co.
- Preparation of ethyl alpha-methyl-alpha-ethylbutyrate which comprises heating a mixture of carbon monoxide and ethylene in a strongly acid medium. No. 2,378,009. William Hanford and John Roland to E. I. du Pont de Nemours & Co.
- Obtaining a haloacetyl halide, which comprises heating anhydrous mixture of carbon monoxide and a polyhalogenated methane in presence of anhydrous Friedel-Crafts type catalyst. No. 2,378,048. Clement Theobald to E. I. du Pont de Nemours & Co.
- Production of iron carbonyl. No. 2,378,053. Albert Wallis and Stanley Townshend to The International Nickel Co. Inc.
- Producing carbon black by thermally decomposing hydrocarbons. No. 2,378,055. William Wiegand and Harold Braendle to Columbian Carbon Co.
- Preparation of chlorhydrins and polyhydric alcohols from olefins. No. 2,378,104. Cortes Reed to Charles Horn.
- Biuret derivatives having general formula  $R-O-CH_2-NH-CO-NH-CO-NH-CH_2-O-R$  in which R is selected from H and CH<sub>3</sub>. No. 2,378,110. John Simons and Welcome Weaver to Libbey-Owens-Ford Glass Co.
- Obtaining quebrachitol from rubber latex serum. No. 2,378,141. William Hart to United States Rubber Co.
- Preparing 2,6-dinitro-4-sulphotoluene, which comprises sulphonating ortho-nitro-toluene with oleum, adding nitric acid to resulting reaction mixture. No. 2,378,168. Michael Witte to Allied Chemical & Dye Corp.
- Ester of a monohydric aliphatic nitro-alcohol with an aliphatic alpha, beta-ethylenically unsaturated carboxylic acid. No. 2,378,169. Courtland Agre and Robert Leekley to E. I. du Pont de Nemours & Co.
- Reaction product of (1) a chlorinated acetamide with (2) product of partial reaction of ingredients comprising an aldehyde and another compound. No. 2,378,198. Gaetano D'Alleio to General Electric Co.
- Production of benzene which comprises treating hydrocarbon fraction consisting of methyl cyclopentane under hydroforming conditions with a molybdenum oxide catalyst. No. 2,378,208. Donald Fuller and Bernard Greensfelder to Shell Development Co.
- Production of aromatic hydrocarbons from naphthenic fractions of nature of gasoline which comprises contacting with a dehydrogenating metal sulfide catalyst, then with a molybdenum oxide catalyst and then with a chromium oxide catalyst. No. 2,378,209. Donald Fuller and Bernard Greensfelder to Shell Development Co.
- Synthesis of toluene which comprises contacting hydrocarbon vapors consisting of dimethyl cyclopentanes under dehydroisomerization conditions with a catalyst consisting of adsorptive alumina impregnated with molybdenum oxide. No. 2,378,210. Donald Fuller and Bernard Greensfelder to Shell Development Co.
- Purifying alkyl phenols containing non-basic nitrogen compounds associated with petroleum and coal tar alkyl phenols, which compounds are not removable by strong mineral acid washes, comprising contacting with alkanolic acid. No. 2,378,232. Daniel Luten, Jr. and Aldo De Benedictis to Shell Development Co.
- Producing ethylene, which comprises dehydrating compound selected from ethyl alcohol and ethyl ether by passing vapors over acid-activated clay catalyst. No. 2,378,236. Hoke Miller to Air Reduction Co. Inc.
- Carrying out continuous fusion reactions between aromatic sulfonates and alkali metal hydroxides. No. 2,378,314. Stuart Miller to Allied Chemical & Dye Corp.
- Preparing 2-amino 4-methyl-pyrimidine which comprises mixing a guanidine salt and a mixture of an alkali methylate, acetone and ester of formic acid in a hydrocarbon solvent. No. 2,378,318. Elmore Northey to American Cyanamid Co.
- Separating fatty acid soaps of black liquor soap from rosin acids by forming a hot, anhydrous solution of fatty acids, rosin acids and alkali to neutralize only fatty acids in organic solvent. No. 2,378,359. Alfred Houpt to American Cyanamid Co.
- 7-Dehydro-campesterol. No. 2,378,435. William Ruigh to E. R. Squibb & Sons.
- Making terpene derivatives which comprises reacting mixture of phenol and material selected from monomers and polymers of an acyclic terpene

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- having general formula  $C_{10}H_{10}$ . No. 2,378,436. Alfred Rummelsburg to Hercules Powder Co.
- Phenylene radical which is substituted in one position by a difluorotrichloro-ethane group and in a meta position thereto by a member of hydrogen, nitro and amino. No. 2,378,453. Viktor Weinmayr to E. I. du Pont de Nemours & Co.
- Manufacturing methyl acrylate by thermal decomposition of methyl alpha-acetoxypropionate in pyrolysis equipment having iron as principal ingredient. No. 2,378,501. William Ratford and Charles Fisher to Secretary of Agriculture of the United States of America.
- Monomeric and polymeric esters of vinyl thiols and process for their manufacture. No. 2,378,535. Merlin Brubaker to E. I. du Pont de Nemours & Co.
- $CoSeSO_4 \cdot (CH_3CH_2O)_4$ ,  $CH_3CH_2OH$ . No. 2,378,551. Winfred Hentrich and Wolfgang Gundel.
- Manufacture of a mixture of keto-butanol 3.1 and 2 methylene keto-butanol 3.1 consisting in condensing acetone below  $50^\circ C$ . with dilute aqueous solution of formaldehyde. No. 2,378,573. Giulio Natta.
- Production of butadiene. No. 2,378,649. William Mattox to Universal Oil Products Co.
- Manufacture of butadiene. No. 2,378,650. William Mattox to Universal Oil Products Co.
- Mono benzyl ether of isobutenyl hydroquinone which boils at  $165^\circ$  to  $172^\circ C$ . at 3 mm. pressure. No. 2,378,698. Carlin Gibbs to The B. F. Goodrich Co.
- Preparation of tetra-alpha-chloro-anthraquinone. No. 2,378,745. Earl Beard to E. I. du Pont de Nemours & Co.
- Liquid composition containing tetraethyl lead and a salt of an aromatic sulfide to increase stability of tetraethyl lead to action of light. No. 2,378,793. Harry Rudel to Standard Oil Development Co.
- Leuco-monoacyl-1,4-diaminoanthraquinone and process for preparing same. No. 2,378,812. William Waldron and Richard Franklin to E. I. du Pont de Nemours & Co.
- Manufacture of chlorinated unsaturated hydrocarbons by splitting-off of molecule of hydrogen chloride from a molecule of a chlorinated hydrocarbon. No. 2,378,859. Martin Mugdan and Derek Barton to The Distillers Co. Ltd.
- Preparing mixture of water-insoluble but oil-soluble saturated aliphatic amines from ketones contained in unsaponifiable mixture of unoxidized hydrocarbons, alcohols, and a plurality of different water-insoluble saturated aliphatic ketones. No. 2,378,880. Arthur Burwell and James Camelford to Alox Corp.
- 3,4-Dihydroxyphenisopropyl alkylamines. No. 2,378,889. Gordon Alles and Roland Icke; said Icke to said Alles.
- Production of ketoalcohols which comprises condensing an aliphatic aldehyde with an aliphatic ketone in an alkaline medium. No. 2,378,988. Henry Dreyfus and James Drewitt; said Drewitt to British Celanese Ltd.
- Producing saturated carboxylic acid derivative of pyran, which comprises reacting a dimethyl-tetrahydro-3-formylpyran with molecular oxygen, in presence of an oxidation catalyst. No. 2,378,996. Benjamin Freure to Carbide and Carbon Chemicals Corp.
- Preparing a naphthalic acid which comprises oxidizing an acenaphthene compound of unsubstituted acenaphthene and substituted acenaphthenes by heating with alkaline to neutral aqueous solution of a hexavalent chromium compound. No. 2,379,032. James Ogilvie and Richard Wilder to Allied Chemical & Dye Corp.
- Terpene derivatives obtained by heating in presence of acid condensation catalyst, material selected from primary and secondary amines with a diene condensation product formed from acyclic terpene with crotonaldehyde. No. 2,379,039. Alfred Rummelsburg to Hercules Powder Co.
- Preparing gamma-trihalobutyronitriles, which comprises reacting haloform,  $NaCH$ , wherein X is halogen selected from chlorine and bromine, with acrylonitrile in presence of alkaline condensing agent. No. 2,379,097. Warren Niederhauser and Herman Bruson to The Resinous Products & Chemical Co.
- Manufacture of lower alkyl esters of alpha-chloroacrylic acid by interaction of formaldehyde, trichloroethylene and a lower aliphatic alcohol, in presence of sulphuric acid. No. 2,379,104. Alexander Roberts to Imperial Chemical Industries Ltd.
- Preparing a glycol bis (saturated alcohol carbonate) ester which comprises reacting a dichloroformate of a glycol with a saturated monohydric alcohol in presence of a basic reagent. No. 2,379,250. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.
- Neutral diester of (a) a polyglycol and (b) two molecules of an acid ester of carbonic acid and a saturated aliphatic alcohol. No. 2,379,252. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.
- N,N'-bis (oxycarbalkenylalkoxy) substituted diamide of a dibasic acid, wherein alkenylalkoxy group contains an olefinic bond. No. 2,379,261. Franklin Strain to Pittsburgh Plate Glass Co.
- Calcium salt of 1-methyl heptyl salicylate. No. 2,379,290. Willard Finley to Sinclair Refining Co.
- Splitting-off of hydrogen chloride from a chlorinated hydrocarbon which contains 2 carbon atoms in molecule and also the grouping— $CHCl-CHCl-$ . No. 2,379,372. Martin Mugdan and Derek Barton to The Distillers Co. Ltd.
- Esters of (1) amino-diols. No. 2,379,381. Robert Shelton and Marcus Campen, Jr. to The Wm. S. Merrell Co.
- Manufacture of crotonyl peroxide by reacting crotonic anhydride, in admixture with water, with hydrogen peroxide, while neutralizing evolved crotonic acid by adding neutralizing agent until solid crotonyl peroxide is precipitated. No. 2,379,390. Karl Tuerck to The Distillers Co. Ltd.
- Amides of high molecular weight carboxylic acids obtained by heating ethylene diamine with substance selected from acids and esters thereof obtained by addition polymerization of methyl esters of tung oil fatty acids. No. 2,379,113. Theodore Bradley to American Cyanamid Co.
- Effecting substitution halogenation of an unsaturated aliphatic halide. No. 2,379,414. Oliver Cass to E. I. du Pont de Nemours & Co.
- Acidyl biurets. No. 2,379,486. Arthur Hill and William Degnan to American Cyanamid Co.
- 2-Methoxy-5-methyl-2, 7-nephthtadiene-1, 4-dione. No. 2,379,494. Milton Orchin and Lewis Butz to the United States of America as represented by Secretary of Agriculture.
- Wetting and emulsifying agent; dioctyl N-(beta-sodium sulfo ethyl) aspartate. No. 2,379,535. Kathryn Lynch and Herbert West to American Cyanamid Co.
- Sulphonation of benzene. No. 2,379,585. James Maguire and David Gould to Allied Chemical & Dye Corp.
- Manufacture of methacrylic acid. No. 2,379,625. Loring Coes, Jr. to E. I. du Pont de Nemours & Co.
- 1 - (4-sulphamylphenyl) - 3- (4-sulphamylphenylimino)-5-aryl-2-pyrrolidone. No. 2,379,639. Martin Hultquist to American Cyanamid Co.
- Treating normally gaseous mixture containing olefins, free hydrogen and a minor amount of acetylene to hydrogenate acetylene without appreciable hydrogenation of olefins, which comprises passing mixture into contact with steel of large surface containing chromium and nickel. No. 2,379,670. Charles Welling and Harold Hepp to Phillips Petroleum Co.
- Reaction product of (1) a chlorinated acetamide with (2) product of partial reaction of aldehyde and compound outlined in patent. No. 2,379,691. Gaetano D'Alenio to General Electric Co.
- Production of diolefins which comprises heating 2-chlorobutene-2 to between  $300^\circ C$ . and  $650^\circ C$ . in presence of compound catalyst comprising material having dehydrogenation-inducing characteristics and "activated alumino," and recovering butadiene-1,3 and compounds isomeric therewith. No. 2,379,697. Theodore Evans and Rupert Morris and Norton Melchior to Shell Development Co.
- Production of derivatives of polyhydroxy alcohols. No. 2,379,703. Daniel Geltner to The Richards Chemical Works, Inc.
- Dehydrohalogenating 2-halobutene-2 which comprises subjecting to between  $400^\circ C$ . and  $750^\circ C$ . in presence of catalyst. No. 2,379,708. George Hearne to Shell Development Co.
- Producing beta butylene from a hydrocarbon mixture comprising isobutylene, alpha and beta butylenes and butanes. No. 2,379,731. Sumner McAllister to Shell Development Co.
- Preparing monochloro derivatives of compound from saturated aliphatic acids having two to ten carbon atoms and esters of such acids and saturated aliphatic alcohols. No. 2,379,759. LeRoy Spence and Fritz Haas to Rohm & Haas Co.
- Manufacture of acetic acid by oxidation of acetaldehyde by means of molecular oxygen characterised by generating acetaldehyde in situ by treating paraldehyde with a depolymerising agent therefor. No. 2,379,760. Hanns Staudinger, Karl Tuerck and Eric Brittain to The Distillers Co. Ltd.
- Preparation of organosilicon compounds which comprises reacting inorganic silicon halide having halogen atom of atomic weight above twenty with an aliphatic hydrocarbon. No. 2,379,821. Henry Miller and Richard Schreiber to E. I. du Pont de Nemours & Co.
- Manufacture of unsaturated ketones of cyclopentano polyhydro phenanthrene series, which comprises reacting unsaturated secondary alcohol of cyclopentano polyhydro phenanthrene series with member of aldehydes and ketones in presence of a metal alcoholate. No. 2,379,832. Arthur Serini, Henrich Koster, and Lothar Strassberger to Schering Corp.

## \* Paints, Pigments

- Recovering and obtaining improved titanium oxide pigment from fines present in overflow fraction from a pigment hydroseparating system, wherein said  $TiO_2$  pigment is dispersed in aqueous slurry suspension by means of alkaline deflocculating agent, which comprises acid-reacting soluble salt of a trivalent metal from aluminum, chromium and iron. No. 2,378,148. Robert McKinney to E. I. du Pont de Nemours & Co.
- Improvement of tinctorial properties of copper-phthalocyanine pigments, comprising dry grinding copper-phthalocyanines with calcined calcium chloride in presence of anion-active dispersing agents. No. 2,378,283. Armin Bucher to Society of Chemical Industry in Basle.
- Pigment consisting of finely divided aluminum dross containing aluminum oxide and metallic aluminum. No. 2,378,432. Francis Rethwisch and Gordon Babcock to Reynolds Metals Co.
- Production of a highly disperse potassium iron chromate pigment, which comprises subjecting aqueous solution of potassium chloride and potassium chromate to electrolysis with anode initially consisting of iron chromium. No. 2,378,572. Wilhelm Muller and Leonhard Spies.
- Producing pigment paste directly from a moist water pulp color in one general stage of operation. No. 2,378,786. Clare Alexander Osborne.
- Treating titanium dioxide pigment which comprises mixing with aqueous slurry of pigment an alkali-metal silicate, and adding as precipitant a water soluble salt of a second group metal. No. 2,378,790. Durant Robertson to National Lead Co.
- Preparing drying oils with improved drying properties which comprises esterifying a polyallyl alcohol with fatty acids derived from dehydrated castor oil, soya bean oil, linseed oil, or their conjugated isomers. No. 2,378,827. Theodore Bradley to American Cyanamid Co.
- Preparing pigmentary material, which comprises heating a mixture of gamma-titanic acid and zinc compound selected from zinc oxide and compounds of zinc, which yield zinc oxide on heating, etc. No. 2,379,019. Andrew McCord and Harold Saunders to The Sherwin-Williams Co.
- Pure, water-insoluble, light-stable, opaque white lead silicate pigment comprising chemically combined lead oxide, silica and chlorine. No. 2,379,270. Louis Barton.
- Dispersing organic pigment dye in organic vehicle by direct transfer of pigment dye from a water slurry to an organic vehicle. No. 2,379,678. Rodney Brown and Richard Roberts to E. I. du Pont de Nemours & Co.

## \* Paper, Pulp

- Manufacturing paper from aqueous suspension including fibrous material and titanium dioxide, and finely divided diatomaceous earth. No. 2,378,193. Arthur Cummins and Carlton O'Neil to Johns-Manville Corp.
- Packaging grease and like which comprises coating inner surface of paper-board container with a wax-in-water emulsion containing graphite in suspension, and then pouring grease into container. No. 2,378,972. Harry Bode to Gaylord Container Corp.
- Method and apparatus for purifying paper pulp. No. 2,379,411. Andre Berges.
- Manufacturing identifiable paper which comprises forming aqueous suspension of cellulosic fibers, incorporating with suspension, hydrated ferric chloride, etc. No. 2,379,443. Morris Kontrowitz and Earl Gosnell.
- Apparatus for continuous testing of pulp freeness. No. 2,379,835. Charles Oland Sisler.

## \* Petroleum

- Producing low-boiling diolefin hydrocarbons of four carbon atoms per molecule from a low-boiling nonaromatic hydrocarbon material comprising more-saturated hydrocarbons of four carbon atoms per molecule.

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

No. 2,377,847. John Allen and I. Louis Wolk to Phillips Petroleum Co. Operating an externally-heated upright oil-cracking retort. No. 2,377,993. Rollin Chatterton and Walter Slade to Fuel Research Development Corp. Dehydrogenation and cyclization of gasoline hydrocarbons which comprises passing hydrocarbons over granules of a solid catalyst comprising a zeolite. No. 2,378,057. Willis Yarnall to The Texas Co. Desulphurizing hydrocarbons oil containing organic sulphur compounds as impurities. No. 2,378,064. Miller Conn to Phillips Petroleum Co. Cracking petroleum. No. 2,378,067. William Dorsett and Orange Walker to Petroleum Conversion Corp. Producing high octane number highly branched chain hydrocarbons in aviation fuel range by catalytic isomerization with a metal halide isomerization catalyst, of a low octane number natural gasoline charge stock containing sulfur. No. 2,378,079. Harrison Hays to Phillips Petroleum Co. Copper sweetening a sour hydrocarbon oil in which portion of the sourness is slow to sweeten. No. 2,378,092. Harold Messmore and James Mason to Phillips Petroleum Co. Producing lower boiling hydrocarbons from higher boiling hydrocarbons. No. 2,378,200. Joseph Danforth to Universal Oil Products Co. Preparing an isoparaffin-olefin fraction free of normal paraffin which comprises contacting a hydrocarbon fraction with a phosphoric acid solution of silver phosphate. No. 2,378,216. Vladimir Haensel and Bernard Friedman to Universal Oil Products Co. Manufacture of high anti-knock gasoline by catalytic conversion of a feed oil at cracking temperatures, which comprises passing stream of gas oil through a tubular heater, heating stream so that the "soaking volume factor" (referred to a coil having a pressure characteristic of 100 pounds per square inch gauge) does not exceed 0.05. No. 2,378,292. du Bois Eastman and Charles Richker to The Texas Co. Diesel fuel of improved cetane number comprising hydrocarbon Diesel fuel and a cetane improving peroxide of a hydrocarbon having aliphatic tertiary carbon atom. No. 2,378,341. William Vaughan and Frederick Rust to Shell Development Co. Converter for hydrocarbon oils wherein vapors of said oils are contacted with a suspended solid conversion catalyst circulating between reaction zone and a regeneration zone, comprising a cylindrical tower, a cylindrical baffle, etc. No. 2,378,342. Vanderveer Voorhees and William Webb to Standard Oil Co. Producing petroleum distillate of reduced sulphur content from a mixture of hydrocarbons containing mercaptans boiling within same range. No. 2,378,382. Victor Abeles. Apparatus for continuous catalytic cracking of hydrocarbon oils. No. 2,378,394. William Degnen, Henry Nelly, Jr. and Percival Keith to The M. W. Kellogg Co. Synthesizing valuable hydrocarbon products by reaction of isobutane and butene in presence of hydrogen fluoride. No. 2,378,439. Carleton Schlesman to Socony-Vacuum Oil Co. Inc. Diesel fuel comprising a fuel oil having present a dinitrate of a poly 1,2 alkylene glycol. No. 2,378,466. George Curme, Jr. to Carbide & Carbon Chemicals Corp. Converting hydrocarbons comprising subjecting hydrocarbons to action of solid hydrocarbon conversion catalyst prepared from a physical mixture of active silica and calcined magnesite stabilized against deterioration by high temperature with oxide of a metal of left column of group VI. No. 2,378,530. James Bailie and Melvin See to Standard Oil Co. Converting a salt contaminated heavy hydrocarbon oil into gasoline of high knock rating. No. 2,378,531. Sam Becker to Standard Oil Co. Alkylation of an isoparaffin with olefinic fraction containing propane in presence of hydrogen fluoride catalyst wherein there is separated from bulk of catalyst a hydrocarbon mixture containing propane and dissolved hydrogen fluoride. No. 2,378,636. John Everson to Universal Oil Products Co. Endothermic catalytic dehydrogenation of a hydrocarbon. No. 2,378,651. Maryan Matuszak to Phillips Petroleum Co. Isomerizing normal butane to isobutane. No. 2,378,685. Samuel Carney to Phillips Petroleum Co. Isomerization of normal paraffins to isoparaffins. No. 2,378,728. Wendell Roach to Phillips Petroleum Co. Effecting catalytic conversion of hydrocarbons by catalyst comprising metallic halide mixed with metallic halide-hydrocarbon complex liquid in presence of hydrogen halide. No. 2,378,733. Eugene Sensel to The Texas Co. Isomerizing hydrocarbons by metallic halide isomerization catalyst in presence of hydrogen halide under conditions such that some metallic halide-hydrocarbon complex is formed. No. 2,378,734. Wynkoop Kiersted, Jr. to The Texas Co. Improving lubricating oil stock having naphthenic and aromatic constituents. No. 2,378,762. Frederick Frey to Phillips Petroleum Co. Isomerizing of normal paraffins containing at least 4 carbon atoms per molecule. No. 2,378,782. Ralph Mason to Standard Oil Development Co. Sulfurizing mineral lubricating oil base stock which comprises adding sulfuric acid, adding powdered sulfur to resultant mixture. No. 2,378,803. Joseph Smith to Standard Oil Development Co. Recovering lubricating oil from a contact clay previously employed for decolorizing lubricating oil by contact therewith comprising admixing clay with liquid solvent for oil retained thereby. No. 2,378,813. James Walker to Standard Oil Development Co. Consolidating a wetted incompetent formation penetrated by a borehole comprising impregnating formation with oily liquid material capable of forming a resin and agent capable of rendering particles of formation preferentially wettable by resin-forming material. No. 2,378,817. Gilbert Wrightsman and Stuart Buckley to Standard Oil Development Co. Producing gasoline from hydrocarbons heavier than gasoline comprising cracking hydrocarbons in presence of catalyst consisting of intimately associated zirconia and alumina. No. 2,378,904. John Bates to Houdry Process Corp. Catalyst for hydrocarbon dehydrogenation reactions consisting of zirconium oxide and iron oxide deposited thereon. No. 2,378,905. John Bates to Houdry Process Corp. Purifying low-boiling aliphatic hydrocarbon mixture which contains undesired reactive impurities, which comprises contacting with mixture comprising alkali metal in molten condition associated with metallic nickel. No. 2,378,969. Grant Bailey and James Reid to Phillips Petroleum Co. Separating into its components a mixture of naphthenic and aromatic hydrocarbons having same vapor pressures. No. 2,378,808. William Sweeney to Standard Oil Development Co. Determination of hydrocarbons in earth formations which comprises heat-

ing sample to vaporize part of said hydrocarbons, passing said vaporized hydrocarbons into a cooled water immiscible absorption medium, etc. No. 2,379,045. Henry Sturgis to Stanolind Oil and Gas Co. Recovering hydrocarbon oil from solid minerals adapted to produce such oil upon application of heat. No. 2,379,077. Clarke Harding to Standard Oil Development Co. Conversion of hydrocarbons to change carbon-to-hydrogen ratio comprising subjecting saturated hydrocarbons in gaseous state to influence of molten boric oxide containing activating metallic oxide. No. 2,379,081. Walter Hupke and Theodore Vermeulen to Union Oil Co. of California. Catalytic cracking of hydrocarbons wherein used cracking catalyst from hydrocarbon conversion is regenerated in a regenerating zone. No. 2,379,159. Elmer Kanhofer to Universal Oil Products Co. Catalytic conversion of a hydrocarbon to change its carbon to hydrogen ratio which comprises subjecting hydrocarbon to contact with metal oxide catalyst prepared by adding aqueous solution of a soluble alkaline hydroxide to salt of a metal capable of producing a gelatinous hydroxide or hydrous oxide, etc. No. 2,379,172. Maryan Matuszak to Phillips Petroleum Co. System for catalytic conversion of petroleum hydrocarbons. No. 2,379,195. Thomas Simpson, John Payne and John Crowley, Jr. to Socony-Vacuum Oil Co. Inc. Storage system for volatile petroleum oils comprising a normally closed and sealed storage tank composed of metal, etc. No. 2,379,215. Edgar Brinkmann. Improving Diesel fuel which comprises reacting a mercaptan with inorganic hypochlorite to form an oil-soluble ignition accelerator possessing oxidizing potency of active oxygen and incorporating said accelerator into petroleum fuel oil. No. 2,379,228. George Gilbert to Standard Oil Development Co. Separating monolefin from a first hydrocarbon stream containing same and a close-boiling paraffin hydrocarbon and also separating essentially monolefin-free aliphatic conjugated diolefin from a second hydrocarbon stream containing same and from a different source than said first hydrocarbon stream, etc. No. 2,379,332. Philip Arnold to Phillips Petroleum Co. Manufacture of motor fuel of high antiknock value from a naphtha hydrocarbon mixture containing aromatic hydrocarbons and non-aromatic hydrocarbons including paraffins and naphthenes. No. 2,379,334. Harold Atwell to The Texas Co. Catalytic alkylation of hydrocarbon with alkylating agent in presence of liquid catalyst. No. 2,379,368. Maryan Matuszak to Phillips Petroleum Co. Producing octanes from hydrocarbon mixtures containing butylenes. No. 2,379,410. Richard Bannerot, Arthur Boulbee, and Bernard Greensfelder to Shell Development Co. Combination thermal and catalytic cracking of hydrocarbon oils. No. 2,379,471. Joseph Barron to The Texas Co. Treating oil well which tends to produce both oil and water to reduce amount of water, flowing into well, which comprises placing oil slurry of a finely-divided, oil-wettable, water-repellent, material opposite formation surrounding well bore. No. 2,379,516. Allen Garrison to Texaco Development Corp. Increasing production of oil or gas well comprising introducing water absorbing fluid into interstices of formation to contact water adsorbed therein, said water absorbing fluid consisting of sulfuric acid. No. 2,379,561. Edwin Bennett to Continental Oil Co. Apparatus for refining crude petroleum comprising means for mixing and emulsifying hydrocarbon and water, means for supplying water and hydrocarbon, to be mixed to mixer, etc. No. 2,379,563. Lavoey Carter and John Barrow; said Carter to said Barrow. Desulphurizing liquid hydrocarbon distillates which comprises passing distillate in vapor phase through a bed of a catalyst consisting of carbon containing alkaline material to condense distillate upon cooling, and to convert mercaptans and other organic sulphur combinations to hydrogen sulphide. No. 2,379,654. Leslie Royer to Skelly Oil Co. Conversion of higher boiling hydrocarbons into lower boiling hydrocarbons for motor fuel. No. 2,379,711. Charles Hemminger to Standard Oil Development Co. Isomerizing naphthenic hydrocarbons having six carbon atoms to molecule and containing five carbon atoms in ring to isomeric naphthenic hydrocarbons having six carbon atoms to molecule and containing five carbon atoms in ring. No. 2,379,749. William Ross and Theodore Vermeulen to Shell Development Co.

### \* Photographic

Gelatino-silver halide emulsion containing a fog inhibiting amount of ethyl trichloroacetate. No. 2,378,203. George Fallesen to Eastman Kodak Co. Gelatino-silver halide emulsion containing a fog inhibiting amount of an alkali metal salt of dl-mandelic acid. No. 2,378,204. George Fallesen to Eastman Kodak Co. Forming photographic tone correction mask which comprises giving light-sensitive silver halide emulsion layer an exposure through transparency of such intensity that only toe densities of said transparencies are recorded, etc. No. 2,378,213. Paul Glasoe to Eastman Kodak Co. Concentrated liquid hardener which has little tendency to form incrustations comprising viscous solution containing boron compound, simple aluminum salt having hardening properties and a hydroxy aliphatic amine acting as a solvent. No. 2,378,247. Harold Russell to Eastman Kodak Co. Dry acid hardening fixing composition comprising a fixing agent, a soluble sulfite, a salt of an aliphatic acid, an aluminum hardening agent and an acid sulfate as generator of free aliphatic acid from salt thereof. No. 2,378,248. Harold Russell and Lowell Muehler to Eastman Kodak Co. Removing silver from a photographic layer containing silver and dye in particles of water-permeable solvent insoluble in water. No. 2,378,265. Paul Vittum and Edwin Jelley to Eastman Kodak Co. Producing a colored photographic image in a gelatino-silver halide emulsion layer which comprises exposing layer and developing it with primary aromatic amino developing agent in presence of a coupler compound. No. 2,378,266. Paul Vittum, Kearney Griffin and Arnold Weissberger to Eastman Kodak Co. Light-sensitive material which consists of carrier having layer comprising compound of diazo phenol, diazo phenol ether and diazo phenol alkyl ether all free from amino substituents of small light-sensitivity and sensitizer consisting in organic compound free from heavy metal, etc. No. 2,378,583. Maximilian Schmidt and Gottlieb von Poser. Safety paper which contains reducible salt selected from mercury tungstate, barium tellurite and barium selenite, and compound selected from

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

ammonium-iron-cyan-tungstate and ammonium-iron-cyan-molybdate. No. 2,378,585. Adolf Schroth.

Photographic silver halide emulsion spectrally sensitized with a cyanine dye selected from monomethine and trimethine cyanine dyes, the emulsion containing, to modify spectral sensitivity, aromatic ester. No. 2,378,917. George Falcen and John Leermakers to Eastman Kodak Co.

Photographic element comprising a base, a light sensitive emulsion layer, a light-blocking outer antihalation layer disposed on each side of element composed of casein and gelatin. No. 2,379,373. Otis Murray to E. I. du Pont de Nemours & Co.

Conditioning carbohydrate-containing gums for forming non-turbid photographic layers which comprises adding to aqueous dispersion of gums, water-soluble water-softening agent to convert alkaline earth metal salt thereof into water soluble salts. No. 2,379,646. Fritz Mueller to General Aniline & Film Corp.

\* Polymers

Heat-curable aminoplast having intercondensed therein a simple, partial amide of a polycarboxylic acid. No. 2,377,866. Gaetano D'Alenio to General Electric Co.

Resinous reaction product of aminotriazine, an aldehyde and sulfamic acid. No. 2,377,867. Gaetano D'Alenio to General Electric Co.

Condensation product of aminotriazine, active methylene-containing body and amino compound selected from (1) amphoteric amino carboxylic acids and amphoteric amino sulfonic acids, etc. No. 2,377,868. Gaetano D'Alenio to General Electric Co.

Producing light colored, amorphous, clear, glassy, stable chlorinated solid resins from petroleum hydrocarbons. No. 2,377,914. Chester Adams to Standard Oil Co.

Stretching cast rod of a thermoplastic resin from polymerized esters of acrylic and methacrylic acids. No. 2,377,928. Frederick Fieditz and Bernard Marks to E. I. du Pont de Nemours & Co.

Method of and apparatus for shaping thermoplastic sheets. No. 2,377,946. Richard Leary to E. I. du Pont de Nemours & Co.

Apparatus for cementing together a pair of curved mating parts of plastic material. No. 2,377,962. Paul Preston to E. I. du Pont de Nemours & Co.

Solution of a synthetic linear polyamide in a mono nitro derivative of a monohydric aliphatic alcohol of 2 to 8 carbon atoms and wherein nitro group occupies alpha position. No. 2,377,985. William Watkins to E. I. du Pont de Nemours & Co.

Polyvinyl ethers of beta guanylethanol. No. 2,378,015. Ray Houtz to E. I. du Pont de Nemours & Co.

Producing laminated safety glass, which comprises assembling a plurality of glass and plastic laminations to form a sandwich, etc. No. 2,378,016. William Hubbard to Libbey-Owens-Ford Glass Co.

Production of polystyrene resin from a styrene solution, which comprises carrying out heat-polymerization of styrene in presence of compound selected from formaldehyde, paraformaldehyde and trioxymethylene. No. 2,378,089. Allen Krotzer, Wilbert King and Julius Kleiner to Allied Chemical & Dye Corp.

Recovering hard copal resins of kauri type from resin-bearing coals, density of coal being greater than that of resins, which comprises treating with water containing tannic acid. No. 2,378,152. Adriaan Nagelvoort.

Copolymer comprised of conjugated butadiene having a chlorine substituent in 2- and 3-positions, a conjugated hydrocarbon butadiene, and vinylidene chloride. No. 2,378,189. Albert Clifford and William Wolfe to Wingfoot Corp.

Interpolymerization products of vinyl chloride and diesters of itaconic acid. No. 2,378,194. Gaetano D'Alenio to General Electric Co.

Polymerizing solution of divinyl benzene in a dialkyl benzene in presence of both an inhibitor of and a catalyst for polymerization. No. 2,378,195. Gaetano D'Alenio to General Electric Co.

Reacting solution of divinyl benzene in diethyl benzene and carbon tetrachloride, until a fusible, heat-convertible, partial polymer is formed. No. 2,378,196. Gaetano D'Alenio to General Electric Co.

Heat-convertible, fusible partial copolymer of divinyl benzene and compound of class consisting of allyl, methallyl and chlorallyl alcohol esters of unsaturated monocarboxylic acids, etc. No. 2,378,197. Gaetano D'Alenio to General Electric Co.

Synthetic resinous compositions comprising intercondensation products of vinyl esters, guanazoles, aldehydes, and/or ketones. No. 2,378,199. Gaetano D'Alenio to General Electric Co.

Dispersion comprising an insoluble, gelled, polycarboxylic acid-polyhydric alcohol resin dispersed in an organic solvent which is normally a solvent for ungelled resin and morpholine as dispersing agent. No. 2,378,230. Julius Little to Hercules Powder Co.

Joining wood veneers in edge to edge relation which comprises applying between adjacent edges an adhesive mixture of a heat reactive resin of urea formaldehyde class and formaldehyde in presence of water. No. 2,378,244. Henry Pfenning, one-half to B. P. John Furniture Corp.

Dehydration of organic solvents, gasoline, oil and kindred liquids such as are not miscible with water and do not react with polygalacturonic acids or salts, which comprises placing in contact with liquid to be dehydrated polygalacturonic salt. No. 2,378,281. Rowland Browne to African Sisal & Produce Co. Ltd.

Polyvinyl acetal resin plasticized with mixture of diethylene glycol dipropionate and butyl carbitol butyrate. No. 2,378,288. Elmer Derby to Monsanto Chemical Co.

Making shatterproof laminar structure which includes integrally bonding a sheet comprising a high molecular weight acrylate polymer selected from polymers and copolymers of acrylic and methacrylic esters to a nitro cellulose coated surface of a cellulose ether sheet with a bonding agent selected from liquid monomers and low molecular weight polymers and copolymers of acrylic and methacrylic esters. No. 2,378,291. Frederick Dulmage, Jr. and Toivo Kauppi to The Dow Chemical Co.

Clear, stable, aqueous sirup containing dicyandiamide-formaldehyde condensation products to which a hydrophilic melamine-formaldehyde aqueous sirup has been added and containing a salt of an alkali and a volatile organic acid. No. 2,378,362. Kurt Ripper to American Cyanamid Co.

Formed film-coated article shaped by deformation of a film-coated metallic body, comprising a primer coat of insoluble dried copolymer of styrene and benzene-soluble resinous polycyclopentadiene, and top coat of a polymerized vinyl compound. No. 2,378,445. Frank Soddy to The United Gas Improvement Co.

Formed film-coated article comprising a primer coat of insoluble dried copolymer of methyl styrene and benzene-soluble resinous polycyclopenta-

diene, and top coat of a polymerized vinyl compound. No. 2,378,446. Frank Soddy to The United Gas Improvement Co.

Plasticized composition comprising plasticizable organic substance and as plasticizer therefor an aliphatic monobasic acid ester of an alkyl phenyl-ethyl alcohol. No. 2,378,447. Frank Soddy to The United Gas Improvement Co.

Moldable fiber composition from continuous sheet composition having extensibility and flow under heat and pressure required for molding of deep-drawn shapes. No. 2,378,477. Albert Hanley to Bakelite Corp. and to Respro Inc.

Regenerated cellulose sheet containing a water soluble organic sulfoxide. No. 2,378,479. William Hoffman and Richard Schreiber to E. I. du Pont de Nemours & Co.

Fibre-forming condensation polyamide which on hydrolysis yields a mixture of diamines and dibasic acids, said polyamide being stabilized with compound selected from boric acid containing only boron and oxygen in acid radical, a salt and an ester thereof. No. 2,378,494. Robert Moncrieff and Edward Wheatley to Celanese Corp. of America.

Subjecting a polyvinyl thiol ester to hydrolysis. No. 2,378,536. Merlin Brubaker to E. I. du Pont de Nemours & Co.

Producing a polycondensation substance which comprises heating hydrazine dicarboxylic diamide and sebacic acid diamide, etc. No. 2,378,571. Otto Moldenhauer and Helmut Bock.

Friction element, binding agent of which comprises heat reacted mixture of fusible, potentially reactive oxidation resisting, castor oil modified glycerol phthalate resin and a fusible resin prepared by heating mixture of phenol, aniline and formaldehyde. No. 2,378,575. Arthur Norton to Monsanto Chemical Co.

To inhibit decomposition of nitrocellulose, a hydrazide selected from oxamiv hydrazide, gamma-phenoxy butyric hydrazide, cyanacetic hydrazide, palmitic hydrazide, etc. No. 2,378,594. Donald Swan and John Calhoun to Eastman Kodak Co.

Stabilized plastic composition comprising a polyvinyl acetal resin and a saturated quaternary ammonium hydroxide. No. 2,378,619. Thomas Carwell to Monsanto Chemical Co.

Alkali-soluble polymer which consists of interpolymerization product of maleic anhydride and ethylene. No. 2,378,629. William Hanford to E. I. du Pont de Nemours & Co.

Thermoplastic composition as a saturant for fibrous material which comprises rosin, candelilla wax, cumar, reclaim rubber, sulfur, anti-oxidant. No. 2,378,674. John Wiley to Armstrong Cork Co.

Increasing dielectric strength of plasticized compositions comprising polymers in which predominant vinyl chloride which comprises incorporating lead silicate which has been dispersed in water, coagulated with water-soluble compounds of lead or water-soluble compounds of barium, and dried. No. 2,378,739. George Taft to The B. F. Goodrich Co.

Plasticized vinyl compounds comprising (1) product of polymerization of a vinyl halide and (2) a polycarboxylic acid polyester of a nuclearly halogenated aryl ethyl alcohol. No. 2,378,753. Gaetano D'Alenio to General Electric Co.

Product of copolymerization of a preformed phenolaldehyde resin and material selected from monomers and polymers of acyclic terpenes having three double bonds per molecule. No. 2,378,794. Alfred Rummelsburg to Hercules Powder Co.

Resinous product comprising primary aromatic amine formaldehyde resin alkylated by and cross-linked with hardening agent comprising a chloroacetate of glycerol dichlorohydrin. No. 2,378,831. Loring Coes, Jr. to Norton Co.

Resin comprising primary aromatic amine formaldehyde resin alkylated by and cross linked with a resin-hardener comprising mono-, di-, tri-, ethylene glycol dimonochloracetates or tri-methylene glycol dimonochloracetate. No. 2,378,832. Loring Coes, Jr. to Norton Co.

Resin comprising primary aromatic amine formaldehyde resin alkylated and cross linked by agent taken from di-2-chlorethyl phthalate, di-2-chlorethyl maleate and di-2-chlorethyl succinate. No. 2,378,833. Loring Coes, Jr. to Norton Co.

Intermediate product that is moldable and hardened under heat treatment comprising a primary aromatic amine formaldehyde resin and hardening agent selected from glycerol tri-monochloracetate and tri-methylol propane tri-monochloracetate. No. 2,378,834. Loring Coes, Jr. to Norton Co.

Water-resistant alkyl resin of low acid number formed by heating normally liquid oil selected from naturally occurring unsaturated fatty acid oils and unsaturated fatty acids derived by saponification in presence of naphthalene, with phthalic anhydride. No. 2,378,886. Herbert Weide to Monsanto Chemical Co.

S-substituted mercaptomethyl ethers of hydroxylated polymers. No. 2,378,898. William Burke to E. I. du Pont de Nemours & Co.

Packaging rosin comprising introducing hot liquid rosin into a cellulose base container, correlating temperature at which rosin is poured into container with absorption characteristics of container material, etc. No. 2,378,920. Charles Gillican, one-half to Nello Resin Processing Corp., and one-half to Filtered Rosin Products, Inc.

Plasticizing a synthetic linear polyamide comprising reaction product of polymerizable monoaminomonocarboxylic acids and mixtures of diamines with dicarboxylic acids. No. 2,378,977. Merlin Brubaker to E. I. du Pont de Nemours & Co.

Plastic composition comprising cellulose acetate and total plasticizer, said plasticizer selected from p-tertiary alkyl phenoxy ethanol and p-tertiary alkyl phenoxy ethyl acetates and a solvent plasticizer. No. 2,379,036. Frank Piech to Hercules Powder Co.

Producing molded product comprising, subjecting fibrous material and a heat curable resinous binder carried thereby to a pressure not lower than 1000 pounds per square inch at a molding temperature, etc. No. 2,379,163. Kenneth Landon to Westinghouse Electric Corp.

Making frictioning lining from fiber-containing compound having an oil-modified thermosetting resin as a binder. No. 2,379,166. David Lucid to General Motors Corp.

For aircraft storage battery, molded container comprising a strong, self-sustaining vinyl resin which is inert under conditions prevailing in battery. No. 2,379,189. John Rupp to National Battery Co.

Preparing sheet of clear resinous polymer of an ester having two terminal alkyl radicals each containing at least three carbon atoms in a straight chain and having olefinic bond between second and third carbon atoms from valence bond. No. 2,379,218. William Dial and Charles Gould to Pittsburgh Plate Glass Co.

Polymer-condensation product of an oxygen-containing aliphatic compound having oxygen atom connected only to carbon and having a chain of more than ten carbon atoms. No. 2,379,229. Anthony Gleason to Standard Oil Development Co.

Plasticizing without gelling of fusible, soluble, organic plastic material in very finely-divided, solid form obtained by adding to solution of plastic a liquid non-solvent for plastic to point of incipient gelation of solu-

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

tion, etc. No. 2,379,236. John Jenkins to Pittsburgh Plate Glass Co.

Forming fine, pigmented powders of organic plastics, which comprises suspending pigment in solution of organic plastic in solvent for plastic, adding to solution a non-solvent liquid medium for plastic until point of incipient gelation is reached, etc. No. 2,379,237. John Jenkins to Pittsburgh Plate Glass Co.

Preparing shaped sheet of hard polymer of a diester having two unsaturated groups derived by esterification of a monohydroxy alcohol which has unsaturated linkage in straight carbon chain. No. 2,379,247. Irving Muskat to Pittsburgh Plate Glass Co.

Preparing curved sheets of polymer of an ester containing two unsaturated molecular groups in which unsaturation is in straight carbon chain and is attached to second carbon from ester linkage. No. 2,379,248. Irving Muskat to Pittsburgh Plate Glass Co.

Preparation of a diolefin polymerizate, step of stripping unreacted olefinic components from aqueous emulsion polymerizate mixtures after polymerization by volatilization in presence of an ester wax which is water insoluble. No. 2,379,268. John Zimmer to Standard Oil Development Co.

Copolymerizates of isoolefins and vinyl halides and process of preparing same. No. 2,379,292. Anthony Gleason to Standard Oil Development Co.

Polymerizate of an alpha, beta-ethylenically unsaturated aliphatic carboxylic acid ester of an aliphatic alcohol with a polymerizable conjugated butadiene. No. 2,379,297. Jesse Harmon and Charles Mighton to E. I. du Pont de Nemours & Co.

Manufacturing of a dicarboxylic acid ester of cellulose. No. 2,379,309. Carl Malm and LaMoyné Bearden to Eastman Kodak Co.

Manufacture of cellulose esters having a high propionyl or butyryl content. No. 2,379,310. Carl Malm and Loring Blanchard, Jr. to Eastman Kodak Co.

Reaction of an alkylated phenol with a condensation product of turpentine and phosphorus pentasulphide, alkyl group being a saturated aliphatic radical. No. 2,379,312. Robert May to Sinclair Refining Co.

Reaction product of zinc oxide and an organic compound resulting from reaction of condensation product of turpentine and phosphorus pentasulphide with an alkylated phenol. No. 2,379,313. Robert May to Sinclair Refining Co.

Preparation of synthetic resins consisting of mixing oxidized rubber obtained by oxidizing rubber in solution with oxidizing gas in presence of metallic catalyst such as cobalt linoleate with maleic anhydride, adding oxalic acid as catalyst and phenol, etc. No. 2,379,375. Frederick Popham to The British Rubber Producers' Research Association.

Producing chlorinated polymer of vinyl chloride which comprises preparing aqueous dispersion of polyvinyl chloride and passing chlorine into dispersion in presence of actinic radiation. No. 2,379,409. Reginald Bacon and William Evans to Imperial Chemical Industries Ltd.

Plastic-elastic substance of class consisting of rubber, gutta-percha, balata and synthetic rubbery high molecular weight conjugated diolefin polymer together with petroleum phenol insoluble in aqueous caustic alkali and containing 9 to 27 carbon atoms and non-phenolic, non-carbonyl oxygen in molecule. No. 2,379,482. Per Frolich to Jasco, Inc.

Preparing dry solid mixture of polymerized glyoxal hydrates which comprises distilling aqueous solution of glyoxal. No. 2,379,555. Joseph Walker to E. I. du Pont de Nemours & Co.

Transparentizing a synthetic linear polyamide having quench index above 125 mils and which is opaque by presence of voids. No. 2,379,557. William Watkins to E. I. du Pont de Nemours & Co.

Catalytic polymerization of isobutene, including contacting isobutene with catalyst comprising a boron halide complex. No. 2,379,656. Robert Ruthuff.

Polymerizing aliphatic olefins having less than 10 carbon atoms per molecule in liquid phase with Friedel-Crafts catalyst, and recovering a viscous oil having wax-modifying properties. No. 2,379,728. Eugene Lieber and Harry Rice to Standard Oil Development Co.

### \* Processes and Methods

Fractionating temperature gradient method of analysis. No. 2,377,900. Walter Podbielniak to Benjamin Schneider.

Obtaining temperature control in regeneration zone for powdered catalyst. No. 2,377,935. Robert Guinness to Standard Oil Co.

Separating carbon dioxide from gaseous mixtures by contacting such gases with aqueous solution of monoethanolamine, stabilizing monoethanolamine solution to prevent corrosion of iron equipment by maintaining dissolved copper in the solution. No. 2,377,966. Robert Reed to The Girdler Corp.

Method of gas testing in which gas containing combustible constituent is passed over identical pair of heated filaments operated at a temperature to induce combustion of said constituent, one of filaments acting as testing filament and other as compensating filament, the method of decreasing the disturbing effects of non-combustible constituents. No. 2,378,019. Moses Jacobson to Mine Safety Appliances Co.

Etching process. No. 2,378,052. Samuel Waldman and George Coggins to Aerox Corp.

Determining level of a liquid in a vessel which comprises passing fast neutrons from a source inwardly through a vertical wall of the vessel, measuring amount of neutrons scattered and slowed down within vessel and returned to a detector, etc. No. 2,378,219. Donald Hare to The Texas Co.

Effecting cation exchange in liquids which comprises contacting with a sulfated asphaltic material. No. 2,378,307. Otto Liebknecht to The Permutit Co.

Regulating the bulk density of coke-oven charges. No. 2,378,420. Freeman Lohr and Gilbert McGill to Koppers Co. Inc.

Method and apparatus for catalytic processes. No. 2,378,542. Wayne Edmister to Standard Oil Co.

Process for halogenation. No. 2,378,675. William Agnew and Sandford Cole to National Lead Co.

Producing sealing deposit in bore of a well, which consists in placing fragmented magnesium at desired location and allowing corrosive solution to contact magnesium. No. 2,378,687. Leonard Chamberlain to The Dow Chemical Co.

### \* Rubber

Manufacture of synthetic elastomers, comprising polymerizing a conjugated diolefin hydrocarbon in aqueous emulsion containing a tertiary alkyl mercaptan. No. 2,378,030. John Olin to Sharples Chemicals, Inc.

Composition of vehicle tires consisting of mixture of wood ash, cotton fibres, reclaimed rubber, sawdust, sand and waterproof glue. No. 2,378,102. Gaetano Provenzano.

Synthetic rubber-like material obtained by interpolymerization of compound of butadiene-1,3,2-chloro-butadiene-1,3 and their methyl and dimethyl homologues, and compound of chloro-cyano-butadiene-1,3 and its methyl homologues. No. 2,378,140. Herbert Gudgeon, Elias Isaacs, and William Morgan to Imperial Chemical Industries Ltd.

Vulcanizing rubber in presence of an amine salt of a 2-mercapto 4-aryl thiodiazole 5-thione. No. 2,378,269. George Watt to Wingfoot Corp.

Unvulcanized butadiene-styrene elastomer having incorporated zinc salt of an aromatic mercaptan of benzene and naphthalene series. No. 2,378,519. John Vincent to E. I. du Pont de Nemours & Co.

Making synthetic elastomers containing sulfur which comprises heating polysulfide dissolved in aqueous medium in presence of acyl ester of vinyl alcohol, with unsubstituted saturated monocarboxylic aliphatic acid. No. 2,378,559. Jonas Kamlet to Miles Laboratories, Inc.

Rubberlike materials from di-hydroxyalkyl sulphides. No. 2,378,576. Tadao Okita.

Coagulating stable aqueous polymer dispersion prepared by polymerization in aqueous emulsion of a mixture of butadiene-1,3 and monomer copolymerizable therewith in presence of a water-soluble soap as emulsifying agent. No. 2,378,693. Charles Fryling to The B. F. Goodrich Co.

Copolymerizing a butadiene-1,3 hydrocarbon and an alpha-methylene nitrile. No. 2,378,694. Charles Fryling to The B. F. Goodrich Co.

Coagulating synthetic rubber latex prepared by emulsion polymerization of member of butadiene-1,3 isoprene, piperylene, 2,3-dimethylbutadiene-1,3 and chloroprene, in presence of a water-soluble fatty acid soap. No. 2,378,695. Charles Fryling to The B. F. Goodrich Co.

Making hollow inflatable object having opening which is less than one-half greatest diameter of object which includes dipping mold coated with coagulant into a liquid dispersion of rubber to form a deposit on mold. No. 2,378,700. Emile Habib and Gordon Gott to Dewey and Almy Chemical Co.

Manufacturing rubber articles which comprises dipping a coagulant-coated mold into a liquid dispersion of natural rubber compounded for vulcanization except that it is deficient in accelerator, etc. No. 2,378,701. Emile Habib and Gordon Gott to Dewey and Almy Chemical Co.

Making hollow rubber article having a neck portion and a body portion which comprises dipping coagulant-coated mold of smaller size than completed article in a liquid dispersion of rubber to form a deposit of rubber gel thereon, etc. No. 2,378,702. Emile Habib and Gordon Gott to Dewey and Almy Chemical Co.

Reusing vulcanized scrap synthetic rubber comprising a vulcanizate of a copolymer of butadiene-1,3 with unsaturated organic compound selected from acrylonitrile and styrene. No. 2,378,717. Joseph Macey to The B. F. Goodrich Co.

Production of synthetic rubber. No. 2,378,732. Waldo Semon and Charles Fryling to The B. F. Goodrich Co.

Rubber material, consisting in mixture containing a sulfur vulcanizable rubber and acenaphthylene. No. 2,378,881. Francis Cislak to Reilly Tar & Chemical Corp.

Making hollow rubber object having opening which comprises dipping a coagulant-coated mold of smaller size than object into a liquid dispersion of rubber, etc. No. 2,378,882. Emile Habib and Gordon Gott to Dewey and Almy Chemical Co.

Recovering rubber latex from plants which exude latices when cut. No. 2,378,990. Tirey Foster Ford.

Manufacture of oil resisting rubber, comprising reacting rubber with reagent from lead tetracetate and lead tetrabenzoate and then preparing hydroxylated rubbers boiling with caustic alkali. No. 2,379,345. Ernest Farmer to The British Rubber Producers' Research Association.

Preparing reaction products from a rubber solution consisting in adding to solution allyl chloride, and reacting mixture with sulphur dioxide in presence of lithium nitrate as catalyst to produce mixture of rubber sulphones. No. 2,379,354. Frederick Hilton to The British Rubber Producers' Research Association.

Butadiene rubber material in which is incorporated a sticky, non-oxidizable, flame resistant vegetable resin selected from cativo resin and copaiba resin. No. 2,379,389. Neil Tillotson.

Polymerizing a butadiene-1,3 in form of aqueous emulsion in presence of a salt of an organic base as emulsifying agent, which comprises incorporating in emulsion prior to completion of polymerization an activator consisting of compounds ionizable to yield copper and bisulfite ions. No. 2,379,431. Charles Fryling to The B. F. Goodrich Co.

Treating rubber which comprises vulcanizing it in presence of a tetrahydro polycyclic quinone of condensed ring structure. No. 2,379,460. Winfield Scott, deceased, by Ruth Scott, executrix, to Wingfoot Corp.

Rubbery butadiene-acrylonitrile copolymer and cyclized rubber. No. 2,379,464. Herman Thies to Wingfoot Corp.

Stable, finely-dispersed anti-oxidant composition useful in preventing aging of rubber, said anti-oxidant prepared by mixing detergent selected from higher aliphatic sulfonates and alkali metal salts of higher fatty acids and phenyl-naphthylamine. No. 2,379,769. Jerome Vinograd to Shell Development Co.

### \* Specialties

Lubricant comprising a mineral lubricating oil having dissolved therein an allophanate of an alicarboxylic alcohol. No. 2,377,909. Paul Van Ess and Ellis White to Shell Development Co.

Dielectric material comprising barium titanate and a fluoride of a metal of group II. No. 2,377,910. Eugene Wainer and Allen Salomon to The Titanium Alloy Manufacturing Co.

Liquid roof surfacing compound, comprising resinous mixture consisting of para-coumarone indene, rosin modified phenol-formaldehyde resin, mineral asphalt, drying fish oil, naphtha, and bituminous mixture consisting of liquid petroleum asphalt and asbestos fibers. No. 2,377,927. Charles Evans to The Master Mechanics Co.

Abrasive article comprising abrasive grains bonded as porous body by means of vitrified ceramic material and a filler incorporated in pores comprising furfuryl alcohol polymerized with lignin. No. 2,377,995. Loring Coes, Jr. to Norton Co.

Dielectric material comprising eutectic mixture of coumarone-indene-cyclopentadiene resin and ethyl pentachlorobenzene. No. 2,378,160. Samuel Ruben.

Preparing char comprising heating bone coal containing about 51 per cent fixed carbon, 31 per cent volatile material and 17 per cent ash. No. 2,378,246. John Rush to Sealeo By-Products Co.

Insecticidal composition comprising as active toxicant an alpha-diphenyl-ethane fraction. No. 2,378,309. George Lynn and Fred Fletcher to The Dow Chemical Co.

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

**Insecticide composition.** No. 2,378,310. George Lynn and Fred Fletcher to The Dow Chemical Co.

**Making porous insulating articles** which includes: treating exfoliated vermiculite with aqueous solution containing vermiculite of a mixture of water-soluble heat-setting resin and cold-water-soluble cellulose ether. No. 2,378,322. Norman Peterson to The Dow Chemical Co.

**Preformed, composition tile** comprising filler and binder, said binder including hard resin selected from polymers of coumarone, indene, and styrene; alkyl resin consisting of a polymeric condensation product of a polyhydric alcohol and an organic dicarboxylic acid; and plasticizer. No. 2,378,377. Martin Bare to Armstrong Cork Co.

**Adhesive composition** of improved adhesive and film-forming properties, comprising amylaceous substance, water soluble urea, and normally solid acid to stabilize composition against urea decomposition. No. 2,378,378. Hans Bauer to Stein, Hall & Co. Inc.

**Making abrasive articles** from a plurality of superimposed layers of abrasive-included, felted fibrous sheet material. No. 2,378,386. Richard Baumgartner to The Carborundum Co.

**Preformed abrasive material.** No. 2,378,399. Hal Fruth to Galvin Manufacturing Corp.

**Mineral oil composition** comprising mineral oil and an oil-soluble calcium phthalyl alkyl amide compound. No. 2,378,442. Herschel Smith and Troy Cantrell and John Peters to Gulf Oil Corp.

**Oil composition** comprising a mineral oil and oil-soluble aluminum phthalyl alkyl amide compound. No. 2,378,443. Herschel Smith and Troy Cantrell and John Peters to Gulf Oil Corp.

**Constructing sparkproof flooring** over a sub-floor. No. 2,378,623. William Donelson and John Downey to The Federal Flooring Corp.

**Element for polishing silver** and like with mixture of abrasive particles and oil comprising a compressible cellular matrix of oil-resistant vulcanized synthetic polymerization product of an open chain aliphatic conjugated diene and cork granules. No. 2,378,630. Ralph Hill to Armstrong Cork Co.

**Normally stiff, resilient shoe stiffener blank** adapted to be rapidly rendered soft and plastic by moderate heat which comprises a permeable fibrous base carrying within comprising rubber dissolved in a thermoplastic material and then vulcanized. No. 2,378,673. John Wiley to Armstrong Cork Co.

**Fireproofing composition** comprising mixture of thermally unstable chlorinated resinous organic material, zinc carbonate, monocalcium chlorophosphate, wetting agent for solid ingredients, a dispersion medium, and a plasticizer having fire retarding properties. No. 2,378,714. Martin Leatherman.

**Fireproofing composition** comprising zinc carbonate, thermally unstable chlorinated organic material, monocalcium chlorophosphate, a flameproofing accelerator of class consisting of arsenic and antimony trioxide, lead dioxide, stannic oxide, etc. No. 2,378,715. Martin Leatherman.

**Making lubricating oil constituents** which comprises reacting paraffin wax with benzene by means of anhydrous hydrofluoric acid. No. 2,378,763. Frederick Frey to Phillips Petroleum Co.

**Constant low-temperature composition** consisting of a solution of carbon dioxide in non-volatile, normally liquid organic substance selected from monoethyl ether of ethylene glycol, the monoethyl ether of ethylene glycol acetate, etc. No. 2,378,815. Helen Wikoff.

**Metallic soap grease** and petroleum hydrocarbon propane precipitated residual resins having a viscosity index of over 60. No. 2,378,818. John Zimmer and Arnold Morway to Standard Oil Development Co.

**Lubricating oil** comprising mineral lubricating oil and oil-soluble mixed green acid soaps and mahogany acid soaps. No. 2,378,820. Earl Amott to Union Oil Co. of California.

**Filtering element** comprising hollow annulus of liquid permeable cellulose sponge of material wall thickness, and material of fibrous characteristics filling hollow interior. No. 2,378,879. Sidney Zylstra.

**Increasing viscosity of glue** and gelatin which comprises adding deacetylated chitin. No. 2,379,065. Edward Christopher to Industrial Patents Corp.

**Making of roads** by stabilization of base soil with slow-breaking emulsion of heavy hydrocarbon, mixing emulsion with solid in a fluid or semi-plastic state, mixing hydraulic setting medium in powder form with partially dried soil and emulsion mixture, and rolling. No. 2,379,082. Robert James to International Bitumen Emulsions Ltd.

**Well drilling mud** comprising aqueous dispersion of clay and solid particles of slowly soluble molecularly dehydrated alkali-metal phosphate glass. No. 2,379,100. Everett Partridge to Hall Laboratories, Inc.

**Preparing absorptive material** from raw gypsum and drying and evacuating a refrigerating system. No. 2,379,142. Richard Gaugler and Charles Waring to General Motors Corp.

**Plaster composition** comprising anhydrous calcium sulphate and, as catalyst, a mixture of potassium sulphate, zinc sulphate and aluminum sulphate. No. 2,379,222. Joseph Eltridge and Francis Himsforth and Victor Lefebvre; assignors to said Lefebvre.

**Insecticidal composition** comprising pyrethrum and a di-allyl amide of an aliphatic carboxylic acid of 9 to 18 carbon atoms. No. 2,379,223. Theodore Evans and Paul Williams to Shell Development Co.

**Soldering flux** comprising zinc chloride; 19.3% ammonium chloride; 0.9% sodium fluoride; and 5.0% potassium bromide. No. 2,379,234. Oskar Horowitz to Shanda Laboratories, Inc.

**Lubricant** comprising a mineral oil base stock, an oil soluble metal salt. No. 2,379,241. John McNab and Walter Watkins, Jr. to Standard Oil Development Co.

**Improved anhydrous non-rubbery grease composition** comprising mineral oil and mixture of aluminum naphthenate and calcium naphthenate. No. 2,379,245. Arnold Morway and John Zimmer to Standard Oil Development Co.

**Composition of matter.** No. 2,379,251. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

**Inhibiting growth of molds** in or on products fostering such growth comprising bringing into close association with product an aliphatic monocarboxylic compound. No. 2,379,294. Chester Gooding to The Best Foods, Inc.

**Mineral oil composition** comprising a viscous mineral oil fraction containing, to inhibit deteriorating effects of oxidation upon oil, a phosphorus and sulfur-containing reaction product obtained by reaction, of a phosphorus sulfide and material selected from dicyclic terpene and essential oil, comprised of a dicyclic terpene and to suppress formation of haze, an oil-miscible metal salt of a sulfonic acid. No. 2,379,453. Thomas Noland to Socony-Vacuum Oil Co. Inc.

**Bearing material** to be compressed between two movable parts of oscillatable bearing comprising fabric material impregnated with lubricant

composed of ricinoleic acid, castor oil and calcium ricinoleate. No. 2,379,478. Leonard Delp.

**Staining concrete** without preliminary acid treatment which comprises applying concentrated solution of staining chemicals directly to surface of concrete, said chemicals containing as anions only radicals capable of forming soluble calcium salts, and containing sodium acetate and acetic acid to buffer solution. No. 2,379,502. Ernest Swift.

**Liquid adhesive composition** comprising butadiene-acrylonitrile copolymer containing acrylonitrile dispersed in solvent for said copolymer, and toughener for copolymer consisting of pyroxylin. No. 2,379,552. Jan Teppema and Joseph Manning to B. B. Chemical Co.

**Insect repellent composition** comprising N-nitroso-phthalimidine as active ingredient. No. 2,379,723. Elbert Ladd to United States Rubber Co.

**Refining of waxes and mineral lubricating oils** containing wax in suspension, step of cleaning filter surfaces of rotatable drum filters. No. 2,379,754. John Selensky to Standard Oil Development Co.

**Non-corrosive mixture** of aqueous solution of alcohol containing lecithin and inert film-forming hydrocarbon oil of distillation range between that of naphtha and light lubricating distillate. No. 2,379,792. Theodore Donlan to Standard Alcohol Co.

**Lubricant** consisting of acetyl ricinoleate of a lower alcohol, and lithium soap and aluminum soap to make a stable thickened grease lubricant. No. 2,379,850. John Morgan to Cities Service Oil Co.

**Cleaning composition** comprising egg albumen, distilled water, a potassium cocoanut oil soap solution, glycerin, 20% solution of sodium stearate, and 10% solution of sodium hexametaphosphate. No. 2,379,851. John Morgan and Russell Lowe to Cities Service Oil Co.

### \* Textile

**Spinning solution** comprising protein selected from silk fibroin, wool, gelatin, alginate acid and casein finely dispersed in a quaternary benzyl substituted ammonium base. No. 22,650. Rudolph Bley to North American Rayon Corp.

**Aqueous soy protein spinning solution** comprising reaction product of soy protein, NaOH, H<sub>2</sub>O, xanthate, said xanthate comprising reaction product of carbon disulphide and product of sodium hydroxide and ethyl alcohol. No. 2,377,854. Robert Boyer and William Atkinson and Charles Robinette to Ford Motor Co.

**Producing artificial fibers** in which aged alkaline solution of soya protein is spun into an acid coagulating bath, the improvement consisting of hydrolyzing soya protein with pepsin in a hydrochloric acid solution. No. 2,377,885. Oskar Huppert to The Glidden Co.

**Synthetic yarn spinning solution** comprising a cellulose organic acid ester dissolved in a volatile solvent and containing partially polymerized phenol-urea-formaldehyde resin imparting to yarn formed from said solution, a high degree of resiliency, elasticity, a springy hand or feel. No. 2,378,183. John Caldwell to Eastman Kodak Co.

**Stabilizing artificial hydrophilic fibres**, comprising treating with an alkaline dispersion of an alkali soluble water insoluble cellulose ether. No. 2,378,168. James Clark to Sylvania Industrial Corp.

**Apparatus for and method of manufacture** of cupro-ammonium rayon. No. 2,378,211. William Furness to American Rayon Co. Inc.

**Imparting a durable, refined, resilient compacted finish** to cotton cloth which comprises impregnating cloth with an alkali solution of cellulose derivative. No. 2,378,360. Harold Huey and William Russell to Sayles Finishing Plants, Inc.

**Fiber-forming synthetic linear polyamide** and compatible phenol-formaldehyde resin which does not become infusible within 1 to 3 hours at 180° to 270° C. No. 2,378,667. Gordon Vaala to E. I. du Pont de Nemours & Co.

**Textile finishing composition** comprising aqueous dispersion containing monoacyl guanidine in which acyl group is a fatty acid radical containing curable acid-curing thermosetting aminoplast resin selected from melamine-aldehyde resins and urea and thiourea-aldehyde resins. No. 2,378,724. Wilbur Oldham to American Cyanamid Co.

**Treatment of yarns, cords, etc.**, having basis of a cellulosic substance containing free hydroxy groups, which comprises heating and reacting such materials in non-solvent medium comprising mixture of an ester of an acid and an anhydride of a saturated monocarboxylic acid. No. 2,379,026. Robert Moncrieff and Harold Bates to British Celanese Ltd.

**Producing potentially adhesive textile fibers** in a loose separable condition which adapts them to be blended with other fibers comprising carding cellulosic textile fibers of staple length with other textile staple fibers which are inert to etherification, etc. No. 2,379,264. Roger Wallach to American Viscose Corp.

**Laundry finishing composition** comprising compound selected from magnesium sulphate and magnesium chloride, and boric acid, thereby converting soluble soap residues into insoluble magnesium soaps and simultaneously effecting dispersion of magnesium soaps. No. 2,379,458. Edward Robinson to Diamond Alkali Co.

**Preparation of spinning solution** for hollow textile material, which comprises preparing solution containing alkali metal hydroxide and a carbonate, and then admixing coagulable material belonging to group consisting of cellulose esters and a cuprammonium solution of cellulose therein. No. 2,379,783. Orlow Boies and Harold Taylor to The Hartford Rayon Corp.

### \* Water, Sewage, and Sanitation

**Removing emulsified and adsorbed petroleum particles** from saline oil-field waters, which comprises: treating with solution of sodium silicate, adding flocculating agent selected from water-soluble salts of iron and aluminum. No. 2,378,323. Richard Pomeroy to Santa Fe Springs Waste Water Disposal Co.

**Precipitation water softening apparatus**, a treating receptacle comprising inverted truncated conical-like sedimentation portion, etc. No. 2,378,799. Joseph Sebald to Worthington Pump & Machinery Corp.

**Treating a natural water course** into which sewage has been placed for disposal. No. 2,379,554. Richard Tyler.

**Sewage screening apparatus.** No. 2,379,615. James Walker to The American Well Works.

**Water purifying and degasifying apparatus.** No. 2,379,753. Joseph Sebald to Worthington Pump and Machinery Corp.

### Agricultural

**Charging a storage bin** with living cereal grain bulk to prevent harmful

\* Continued from Vol. 575, Nos. 2, 3, 4; Vol. 576, No. 1.

increases of temperature of grain during storage in bin comprising introducing grain in bin simultaneously with ethylene gas. No. 2,381,421. Arnold Balls and Walter Hale to the Secretary of Agriculture of the United States of America.

Hard waxes and fatty products derived from crude sugar cane waxes. No. 2,381,420. Royal Balch to Secretary of Agriculture of the United States of America.

Protecting seeds from birds and animal pests, which comprises applying to seeds a pest-repellent dust composition composed of finely divided absorbent earth and pest-repellent wood-tar oil. No. 2,381,411. John Remensnyder to Heyden Chemical Corp.

Making nallable hard board panel, which consists in converting untreated lignocellulose tissue to natural lignocellulose fibers, etc. No. 2,381,269. Armin Elmendorf and Morris Lieff.

Making moldable lignocellulose having X-ray diffraction pattern characteristic of dehydrated wood which comprises treating mass of small pieces of wood with non-oxidizing dilute aqueous solution of acidic material. No. 2,381,205. Robert Caughey to University of New Hampshire.

Isolating from hydrolyzed lignocellulose produced by pressure acid hydrolysis of plant fibres high yields of pure lignins which comprises treating hydrolyzed lignocellulose with solvent selected from methanol, ethanol, n-propanol, etc. No. 2,380,448. Raphael Katzen to Northwood Chemical Co.

Solution of zein in mixture of water and a water-miscible solvent selected from methyl, ethyl, isopropyl alcohols and acetone, containing carbon disulfide to retard increase of viscosity of zein solution upon standing. No. 2,380,429. Hugh Hagemeyer to Eastman Kodak Co.

Herbicide composition including solution of methyl bromide in a lower alkyl benzene. No. 2,380,416. John Davidson to The Dow Chemical Co.

Composition for treatment of vegetables and fruit for removal of spray residues therefrom and for trees for control of scale thereon comprising: trisodium phosphate, double salt of trisodium phosphate and sodium nitrate and trisodium pyrophosphate. No. 2,380,259. Frederic Pierce.

Filler possessing plastic flow and suitable for hot-molding compositions, comprising heat-masticated redwood wood flour. No. 2,380,214. Harry Burrell to Ellis-Foster Co.

Separation of protein from aqueous waste material which comprises (a) mixing a finely divided solid calcium metaphosphate with said waste material, (b) digesting for a time to precipitate protein as a protein-phosphate complex. No. 2,379,929. Eugene Rushton to Tennessee Valley Authority.

Esterification of lignins and ligninlike material. No. 2,379,890. Rodger Dorland and Robert Boehm to Masonite Corp.

Preparing etherified ligninous composition for molding compositions and like. No. 2,379,889. Rodger Dorland and Robert Boehm to Masonite Corp.

### Biochemical

Extracting compounds with nucleic acid radical, treatment of nucleic acid bearing biologic substance with alkali in absence of applied heat. No. 2,379,912. Louis Laufer to Schwarz Laboratories, Inc.

Recovery of rare sugars which consists in treating solutions of nucleoside bearing substances with copper compound and an acid which conjointly afford cuprous ions, with precipitation of insoluble cuprous salts of nucleosides. No. 2,379,913. Louis Laufer and Jesse Charney to Schwarz Laboratories, Inc.

Mixture of pure cuprous salts of purine nucleotides that have an unsubstituted No. 7 position in purine group. No. 2,379,914. Louis Laufer and Jesse Charney to Schwarz Laboratories, Inc.

Stable aqueous dispersion of hardened protein salts comprising 9% partially hydrolyzed protein salt and 4% excess formaldehyde. No. 2,380,020. George Brothier and Allan Smith.

Preserving dried biological substance desiccated from frozen state which is under high vacuum in a container, including replacing high vacuum with atmosphere of inert gas. No. 2,380,339. Heinz Siedentopf to Fromm Laboratories, Inc.

dl-Tryptophane and processes for producing the same. No. 2,380,479. Eric Stillner.

Steroid compounds and methods for obtaining same. No. 2,380,482. William Tribble to Faximile, Inc.

Steroid compounds and methods for obtaining same. No. 2,380,484. Romeo Wagner to Parke, Davis & Co.

Pectic substance selected from potassium pectates, and a lactone which is capable of reacting with pectic substance to form a homogeneous gel. No. 2,380,739. Lacey Evans and Louis Huber to General Mills, Inc.

Producing oil from oil-bearing protein material of animal origin which is subject to rapid spoilage, which comprises forming aqueous mixture of fresh raw material with alcohol, storing mixture until digestion has taken place, and then recovering oil from mixture. No. 2,380,847. Charles Kaufman to General Seafoods Corp.

Making a modified residue starch which comprises saccharifying 10-20% of starch contained in a raw starch milk by means of a diastatic enzyme, effecting separation between saccharified portion and the remainder, and subjecting latter to treatment with starch liquefying agent to reduce hot paste Scott viscosity characteristic thereof. No. 2,380,848. Ralph Kerr to Corn Products Refining Co.

Hydrolyzing gluten for production of glutamic acid which comprises subjecting gluten to hydrochloric acid containing excess of hydrogen chloride, etc. No. 2,380,890. Vern Waters to General Mills, Inc.

Glycerol fermentation process, which comprises growing yeast crop in a low sugar mash with aeration, ammonia and ammonium salts non-toxic to yeast, etc. No. 2,381,052. Howard Hodge to U. S. Industrial Chemicals, Inc.

Purifying concentrated glycerin solution obtained from fermentation residues and containing free acids and saponifiable matter. No. 2,381,055. Howard Hoyt to U. S. Industrial Chemicals, Inc.

Steroid ester. No. 2,381,073. Karl Miescher and Charles Meystre to Ciba Pharmaceutical Products, Inc.

Manufacture or storage of viscous vegetable globulin solutions in dilute aqueous solutions of alkali metal hydroxide, preventing or delaying surface gelation which comprises maintaining in atmosphere over surface of solution a partial pressure of ammonia. No. 2,381,088. Robin Thomson to Imperial Chemical Industries Ltd.

Process of cultivating yeast with treated waste sulphite liquor. No. 2,381,230. Nils Soderstrom and Helge Rost.

Water soluble composition consisting of an enzyme hydrolyzed alkali metal globulinate in dry form. No. 2,381,407. Arthur Levinson, Percy Julian and Andrew Engstrom to The Glidden Co.

### Ceramics

Etching glass surface to form matte finish thereupon, which comprises spreading upon surface a layer of powdered inert material comprising small particles each of which has individual coating of inert plastic cohesive substance, etc. No. 2,381,479. Frederick Adams to Pittsburgh Plate Glass Co.

### Coatings

Coating composition comprising ester of a hydrogenated rosin acid and a polyalkylene glycol having 3 alkylene groups connected by ether linkages, and organo-soluble film-forming cellulose derivative compatible with water. No. 2,379,974. Julius Little to Hercules Powder Co.

Formed film coated article shaped by deformation of metallic body coated with a dried film comprising reaction product of a sulfur containing vulcanization agent and a benzene soluble resinous polymer of a material consisting of (a) cyclopentadiene and (b) cyclopentadiene admixed with methyl cyclopentadiene. No. 2,380,149. Newcomb Chaney to The United Gas Improvement Co.

Pale drying oil varnish with color no greater than 3L Hellige, characterized by color stability, consisting of a heat-bodied mixture of linseed oil and resin and mineral spirits thinner, resin bearing heat-reaction product of rosin acid crystals crystallized from wood rosin, maleic anhydride, resinous condensate of parateriarymethyl phenol and formalin, and pentaerythritol. No. 2,380,192. Raymond Schlaanastine to Hercules Powder Co.

Spray coating composition, comprising mixed carnauba, paraffin, and bees wax, naphtha, water, and remainder boron. No. 2,380,219. Charles Clinton to Spray Wax Sales Co.

Preparing liquid coating composition, which comprise polymerizing a drying oil containing a polymerization catalyst of Friedel-Crafts type to body not lower than Z-6, arresting polymerization before gelation by addition of inactivator for catalyst selected from guinoline and isoquinoline and thereafter adding resin. No. 2,380,394. Henry Berger, George Crandall and John Socolofsky to Socony-Vacuum Oil Co. Inc.

Preparing coating composition containing oleoresinous varnish base and a vinyl resin. No. 2,380,456. Curtis Maier and Sylvester Flugge and Edward Pieffer to Continental Can Co. Inc.

Apparatus for applying plastic coatings. No. 2,380,499. William Brend to Lock Joint Pipe Co.

Varnish composition of heat-hardenable character useful as a binder for preparation of laminated materials comprising in solution a resinous, ammonia-catalyzed reaction product of formaldehyde and a phenol selected from cresols, xylenols, etc., and a plasticizer comprising methyl abietate. No. 2,380,599. Harry Kline to Bakelite Corporation.

Passing of metal between succession of rolls and wetting it with chemical solution during its passage, where solution is acidulous one which reacts with metal and forms insoluble salts which adhere to metal as a coating. No. 2,381,183. Ernest Richards to Parker Rust Proof Co.

Protection device against aerial and other bombardment comprising structure having coating comprising thin internal layer of shock resistant material and thick external layer of penetration-resistant hard asphaltic concrete. No. 2,381,779. Frederick Scott to Union Oil of California.

### Dyestuffs

Monoazo dyestuffs. No. 2,380,122. Jakob Scheidegger to Society of Chemical Industry in Basle.

Production of disazo dye which comprises coupling a 7-hydroxy-1:2:3:4-tetrahydronaphthopyridine, capable of coupling in 6 position, with a diazotized paramino-mono-azo compound. No. 2,380,488. Christopher Argyle to British Celanese Ltd.

Coloration of textile materials, which comprises mechanically impregnating a textile material made of or containing organic derivative of cellulose with solution of organic derivative of cellulose dyestuff in organic liquid medium. No. 2,380,503. Cyril Croft and Walter Hindle to Celanese Corp. of America.

Trisazo dyestuffs, their copper compounds and their manufacture. No. 2,381,599. Adolf Krebser and Werner Bossard to J. R. Geigy A. G.

### Equipment

Crystallizer apparatus comprising a tank, a shaft extending longitudinally of and within said tank and means for rotating said shaft, a series of hollow heat interchanging elements, etc. No. 2,379,895. Henry Feldstein.

Sampler of granular material embodying means for directing a continuous stream of material toward a receptacle, said means being in form of hopper. No. 2,379,921. Dominick Pizzirani and Franklin Gould and Souren Avedikian.

Filter comprising a framework; rows of springs carried in said framework; and fabric wound over said springs to form a fabric socket, etc. No. 2,379,930. William Saylor, one-half to H. E. Bassford.

Heat exchange device for cooling a stream of fluid. No. 2,379,932. Paul Schoepflin and Charles Deverall and Robert Stutz to Niagara Blower Co.

In a constant pressure distillation apparatus, a distillation tube having a heating zone and a cooling zone, heat reservoir means in the cooling zone, and means responsive to small increases in pressure in distilling tube. No. 2,379,953. Donald Douslin to Phillips Petroleum Co.

Centrifugal separator. No. 2,380,014. Wilmer Bath to The Sharples Corp.

Apparatus for gradually cooling an emulsion of a wax-oil mixture with water and air, which comprises a vertical cooling tower, etc. No. 2,380,077. August Henry Schutte.

Variable volume cell for analyzing reservoir fluid comprising, a cylindrical member having a bore extending internally from end to end, etc. No. 2,380,082. James Sloan to Houston Laboratories.

Sludge separator. No. 2,380,097. Henry Doerner.

High temperature gas heating furnace. No. 2,380,169. Hans Gygi to Aktiengesellschaft Fuer Technische Studien.

Apparatus for pulverizing and classifying friable material suspended in a gaseous medium, a casing, a discharge outlet therefrom for selected material, etc. No. 2,380,321. Henry Lykken and William Lykken.

Flow-meter for remote indication of rate-of-flow of fluids. No. 2,380,399. Harry Bowie to Fischer & Porter Co.

Steam treating apparatus comprising steam and water drum and tubes

connected with drum through which steam and water are delivered to drum, etc. No. 2,380,424. Martin Frisch to Foster Wheeler Corp.

Apparatus for indicating and/or recording fluid levels in a tank. No. 2,380,436. Robert Ellsworth Holdman.

Mass spectrometer. No. 2,380,439. Edmund Hoskins and Robert Langmuir to Consolidated Engineering Corp.

Apparatus for testing foaming characteristics of liquids. No. 2,380,679. Herschel Smith to Gulf Oil Corp.

Centrifugal compressor. No. 2,380,772. Kenton McMahan to General Electric Co.

In a fractionating tower, an apron downpipe construction including pair of vertical supporting strips spaced around and projecting inwardly from inner wall of the tower and rigid therewith, etc. No. 2,380,852. Pierre Lambert, Ralph Riemenschneider and John Gibb to The Lummus Co.

Control apparatus comprising means responsive to variations in condition for producing pressure proportional to a function of condition. No. 2,380,858. Jerome McMahon to Republic Flow Meters Co.

Apparatus for washing granular material, combination of a member mounted for jiggling motion and means for imparting such motion thereto, etc. No. 2,380,881. Fredrick Trostler and William Skelton and Leopold Henschel.

Electrical dust-precipitator system and interchangeable parts therefor. No. 2,380,992. Edward Pegg and Ira Cummings to Westinghouse Electric Corp.

Liquid purifier. No. 2,381,141. John Russell to Luber-Finer, Inc.

Heating fabric having fabric base and piles projecting, said base consisting of fine metallic electrically conductive wires and fine glass filaments, and piles consisting of glass filaments only. No. 2,381,218. Ezekiel Jacob to Benjamin Liebowitz.

In humidity indicator, electrodes disposed in spaced relation, and beryllium fluoride sensitive to changes in humidity in electrical contact with electrodes. No. 2,381,299. Leon McCulloch to Westinghouse Electric Corp.

Gas generator unit in which hydrocarbon gases are to be reacted with oxygen-containing gases in presence of a catalyst. No. 2,381,306. Clarence Peck to Westinghouse Electric Corp.

Portable oxygen-acetylene generator. No. 2,381,319. Rodney Swift.

Heat generating and consuming apparatus, combination of combustion chamber, a stationary aspirating nozzle disposed to deliver atomized liquid fuel into chamber, means for passing through nozzle an aspirating agent, etc. No. 2,381,372. Thomas Stephens.

Instrument for measuring concentration of a fluid comprising means for producing direct current flow which has a known functional relationship to variations in concentrations of fluids tested, a triode, etc. No. 2,381,414. John Wilkie, dedicated to the free use of the People in the territory of the United States.

Electrical precipitation apparatus comprising ionizing agent having radioactive properties, means for subjecting gas having matter suspended therein to influence of ionizing rays emitted by agent whereby matter accumulates electrostatic charge, etc. No. 2,381,455. Carlyle Jacob.

Apparatus for burning off glassware. No. 2,381,467. Harold Schutz to Owens-Illinois Glass Co.

Container for corrosive liquids including inner lining of plate glass, outer reinforcing shell spaced therefrom, the space between two being filled with a corrosion-resistant packing material, said inner lining being formed with a drain opening, etc. No. 2,381,500. Percy Knudsen and Lewis Diera to Pittsburgh Plate Glass Co.

Proportioner for distributing constant, predetermined proportionate mixture of a pest control material and a carrier liquid under all variations of pressure of carrier liquid, said proportioner to be interposed in line through which a carrier liquid is to flow. No. 2,381,589. Stanley Hayes.

Fire extinguishing apparatus. No. 2,381,606. Floyd Lee, one-half to J. Leonard Hull.

Hydrocarbon liquid container having flexible wall structure comprising layers of synthetic plastic materials having rubber-like physical characteristics, and intermediate membrane having lower diffusion characteristics than adjacent layers, said membrane consisting of plastic formed from synthetic linear polyamide. No. 2,381,739. Reid Gray to The Glenn L. Martin Co.

Fire extinguishing unit. No. 2,381,749. James Hull and Floyd Lee.

Apparatus for feeding dry, divided material, feed hopper for material, having pair of opposite, inwardly and downwardly sloping walls for directing material to discharge opening of hopper, etc. No. 2,381,802. George Booth and John Ballard to Wallace & Tiernan Co. Inc.

Device for determining volume of liquid in main receptacle containing liquid and gas under pressure, which comprises auxiliary receptacle of known volumetric capacity, means for establishing equal gas pressures in receptacles different from atmosphere, etc. No. 2,381,821. Tore Helleberg and Sven Malmstrom.

Motor-driven centrifugal pump for liquid. No. 2,381,834. George Meredith and Arthur Dawson to Self-Priming Pump & Engineering Co. Ltd.

Liquid trap sampling line of a gas-detecting apparatus. No. 2,381,837. Ralph Poole.

### Explosives

Producing crystalline trinitrotoluene in form readily adapted to purification treatment, which comprises forming mixture of molten crude aromatic nitrocompound and water, cooling mixture to temperature of crystallization. No. 2,380,246. Max Knake to E. I. du Pont de Nemours & Co.

Producing pure trinitrotoluene, which comprises adding to crude molten trinitrotoluene, cooling water to effect crystallization, and washing crystals with alkaline sulfite solution. No. 2,380,247. Christian Olsen to E. I. du Pont de Nemours & Co.

Purifying trinitrotoluene which comprises subjecting crude trinitrotoluene to treatment with alkali metal sulfite solution to react with isomeric impurities present. No. 2,380,248. Marshall Acken and Robert Cavanaugh to E. I. du Pont de Nemours & Co.

Making explosives, which comprises replacing water in water-wet powder base with alcohol, replacing alcohol with benzene, gelatinizing powder base by incorporating in mixture a volatile water-immiscible solvent therefor, extruding gelatinized powder base into grains, etc. No. 2,381,468. Charles Silk to Olin Industries, Inc.

### Food

Desiccation of citrus fruit juices by sublimation of water from frozen

state, adding to juice before freezing a crystallizable sugar to prevent juice from becoming difficultly soluble in water. No. 2,380,036. Earl Florsdorf to Lyophile-Cryochem Co.

Making coffee extract. No. 2,380,046. Richard Huguenin to Inredec, Inc.

Extraction of sucrose from impure solutions in any state of concentration but free from invert sugar. No. 2,380,087. Alfred Thomsen.

Making artificial coffee beans which are non-staling and non-hydroscopic, comprising mixture extract from roasted coffee with solution containing solids of potassium acid phosphate and corn syrup. No. 2,380,092. Mark Weisberg to Bellefont Associates.

Making water-soluble cacao extract. No. 2,380,158. Hans Durrenmatt and Jean de Schoulenikow to Inredec, Inc.

In refining sugar melts, improvement which comprises treating melt with calcium hypochlorite in presence of a chlorite and with a phosphate defecating agent and thereafter treating melt with activated decolorizing carbon. No. 2,381,090. George Vincent to The Mathieson Alkali Works, Inc.

Improving hulled rice which comprises stirring rice, admixing thereto solution of vitamin B1 and a water-soluble, film-forming substance, etc. No. 2,381,342. Max Frank Furter to Hoffmann-La Roche, Inc.

Improving hulled rice which comprises stirring rice, admixing thereto solution of vitamin B1, continuing stirring until vitamin content of solution is adsorbed on surface of rice. No. 2,381,343. Max Frank Furter to Hoffmann-La Roche, Inc.

Preparing concentrated fluid milk product comprising concentrating milk product containing added sugar by heating said milk product at temperature above 100° F. under partial vacuum, cooling by evaporation, etc. No. 2,381,761. Paul Lemmel and Hugh Fell to The Borden Co.

### Inorganic

Impregnation of lime with carbon. No. 2,380,008. Armand Abrams and Louis Cook to Socony-Vacuum Oil Co. Inc.

Mixture of comminuted brucite and pyrophyllite, said pyrophyllite containing sericite. No. 2,380,198. Ira Sproat to R. T. Vanderbilt Co. Inc.

Inhibiting hydrochloric acid against corrosiveness to ferrous metals which comprises contacting with crude phenols of petroleum origin. No. 2,380,254. Thomas McCulloch to Standard Oil Development Co.

Process and apparatus for producing industrial oxygen. No. 2,380,417. William Lane De Baufre.

Producing a burned dolomite comprising mixing dolomite with fluoride of group consisting of calcium, barium, strontium, magnesium, aluminum and iron. No. 2,380,480. Werner Syz to Aluminium Industrie Aktien-Gesellschaft.

Production of alkali metal percarbonate by interacting in cold aqueous solution hydrogen peroxide and an alkali metal salt of carbonate and bicarbonate to form alkali metal percarbonate and causing alkali metal percarbonate to be precipitated in presence of diphenyl guanidine. No. 2,380,620. Oswald Walters to Imperial Chemical Industries Ltd.

Delaminating block mica which comprises subjecting mica to sonic vibrations while immersed in water bath to introduce film of water between mica laminations. No. 2,380,71. Frederick Fisher to General Electric Co.

Preparing sodium perborate of low bulk density which comprises adding to solution of hydrogen peroxide and borax a solution of alkaline sodium compound selected from sodium hydroxide, sodium carbonate, trisodium phosphate, and sodium peroxide, added at such a rate that supersaturated solution of sodium perborate results. No. 2,380,779. Hugo Nees.

Producing aluminumhydroxide from aluminate liquor. No. 2,380,804. Hans Tiedemann.

Recovering boron fluoride from gases evolved in production of boron containing glass. No. 2,381,027. Emile Baldeschwieler and Peter Gaylor to Standard Oil Development Co.

Producing magnesium oxide from magnesian ores. No. 2,381,053. Gordon Holmes.

Reducing residual barite in fluorspar concentrates derived from ores which comprises pulping ground ore with water, floating pulp in presence of sodium oleyl sulfate, etc. No. 2,381,120. Walter Duncan to Mahoning Mining Co.

Preparing alkali metal cyanide which includes reacting anhydrous heterocyclic ether solution of an alkali metal salt with HCN. No. 2,381,285. William Hill to American Cyanamid Co.

Manufacture of hydrocyanic acid by reacting nitric oxide with a hydrocarbon in vapor phase which comprises passing reacting gases through layer of wire gauze made of a platinum-rhodium alloy and thence through layer of non-porous, granular, refractory material. No. 2,381,344. Howard Green to E. I. du Pont de Nemours & Co.

Production of hydroxylammonium chloride and carboxylic acids from primary nitro hydrocarbons, which comprises refluxing primary nitro hydrocarbon and constant boiling hydrochloric acid, in presence of initially-added carboxylic acid. No. 2,381,410. Philip Tryon to Commercial Solvents Corp.

Cyclic process for production of alumina from siliceous aluminiferous material. No. 2,381,477. John Walthall to Tennessee Valley Authority.

Improving recovery of phosphate ore material for concentration of phosphate values therefrom that is in aqueous pulp. No. 2,381,514. Donald Phelps to The American Agricultural Chemical Co.

Producing factor gases free of nitrogen oxide and adaptable for synthesis of ammonia. No. 2,381,696. James Shapleigh to Hercules Powder Co.

### Medicinal

Composition for oral cavity comprising a secondary alkyl sulphate containing 8 to 21 carbon atoms as active germicidal agent and a carrier base selected from tooth powder, tooth paste and chewing gum. No. 2,380,011. Zelma Baker and Benjamin Miller.

Blood testing apparatus including a casing, a water tank pivotally mounted in casing, a test plate, etc. No. 2,380,168. Cecil James Guthrie.

Refining vitamin-containing oil and improving taste and odor, which comprises contacting fat-soluble vitamin-containing marine oil with hydrogen. No. 2,380,408. Loran Buxton to National Oil Products Co.

Producing vitamin concentrates, one rich in vitamin esters and one rich in vitamin alcohols, which comprises contacting fat-soluble vitamin-containing marine oil with liquid aliphatic organic solvent, etc. No. 2,380,409. Loran Buxton to National Oil Products Co.

Producing fat-soluble vitamin ester concentrate, which comprises saponifying glycerides present in fat-soluble vitamin-containing marine oil, etc. No. 2,380,410. Loran Buxton to National Oil Products Co.

**Fat-soluble vitamin concentration.** No. 2,380,414. Loran Buxton to National Oil Products Co.  
**Producing fat-soluble vitamin concentrate from fat-soluble vitamin-containing marine oil,** which comprises mixing marine oil with a solvent, etc. No. 2,380,418. Bernard Dombrow to National Oil Products Co.  
**Alkali forming metal salt of monoacetyl-2-methyl-1,4-naphthohydroquinone monophosphoric acid ester,** having Vitamin K activity. No. 2,380,716. Bernard Baker to Lederle Laboratories, Inc.  
**Germ counteracting composition** which comprises a soluble quaternary ammonium compound. No. 2,380,877. Robert Shelton to The Wm. S. Merrell Co.  
**Making stable pharmaceutical preparation** containing chloramine T and a metallic iodide. No. 2,380,970. Vladimir Kitter.  
**Dressing for liquid exuding lesion** which comprises plies, one of which is thin, of pliable, hydrophilic, non-porous but water penetrable material in film form, azochloramide distributed throughout ply in contact with lesion, and a bacteriostatic sulfanilamide compound distributed throughout another of said plies. No. 2,381,621. Franz Schmelkes and Frederik de Leeuw to Wallace & Tiernan Products Inc.  
**Injectable preparation for treatment of impaired hearing** consisting of 50,000 units of vitamin A, guaiacol, and eucalyptol. No. 2,381,830. Mervyn Joseph Lobel.

### Metallurgy, Ores

**Magnesium distillation furnace.** No. 2,379,888. Henry Doerner.  
**Air-hardening steel** capable of being annealed to a condition sufficiently soft for commercial machinery requirements and capable of being hardened to carbon, chromium, molybdenum, manganese, nickel, and iron. No. 2,379,988. Carl Post and Maurice Fetzer to The Carpenter Steel Co.  
**Production of electro-deposit,** comprising electrodepositing adherent, abrasion-resistant cathode deposit of oxygen compound of molybdenum from aqueous acid bath including boric acid, a soluble nickel compound, and a soluble molybdenum compound. No. 2,380,044. Raymond Hoffman to E. I. du Pont de Nemours & Co.  
**Heat treating metal compounds** comprising igniting a bed of fuel and material to be treated at its upper surface, etc. No. 2,380,056. Thorne Lloyd to Dwight & Lloyd Sintering Co. Inc.  
**Handling molten magnesium and magnesium base alloy** which consists in increasing resistance to oxidation of molten metal by adding beryllium. No. 2,380,200. Philip Stroup and George Sager to Aluminum Co. of America.  
**Sand casting of magnesium and magnesium base alloy,** providing metal prior to casting with beryllium. No. 2,380,201. Philip Stroup and George Sager to Aluminum Co. of America.  
**Thermally treating magnesium and alloys,** method of minimizing deterioration of metal during treatment which includes providing in metal beryllium, calcium, and surrounding metal with atmosphere containing

fluorine-containing substance in vapor form. No. 2,380,202. Philip Stroup to Aluminum Co. of America.  
**Casting metal** which comprises producing and depositing metal in furnace immersed in layer of flux in a mold. No. 2,380,238. Robert Hopkins to The M. W. Kellogg Co.  
**Producing granulated metal,** which comprises, agitating solid metals while concealed in saw dust and heating mass to plasticize metal, mixing silica gel with concealed and plasticized metal to granulate latter. No. 2,380,253. James McCoy, one-half to Milwaukee Tool & Die Co.  
**Removing impurities as oxides from ferrous metal article** which comprises subjecting articles to cleaning action of fused bath. No. 2,380,284. James Young to E. I. du Pont de Nemours & Co.  
**Making malleable casting,** surface of which has characteristics of high carbon steel, consisting in making white iron casting, etc. No. 2,380,385. Frank Buffum to Bi-Metallic Products Corp.  
**Metallurgical composition for production of sulphur-free metal** which comprises iron ore having incorporated calcined mixture of coking coal with limestone. No. 2,380,406. Russell Buehl to the Government of the United States, as represented by the Secretary of the Interior.  
**Production of magnesium,** forming charge consisting of magnesium oxide, carbon, and oxides lime, silica, and alumina. No. 2,380,449. Roy Kirk to The Dow Chemical Co.  
**Treating beryllium copper alloys** of cold workable and precipitation hardenable type, which comprises heat treating alloy to produce a heterogeneous crystal structure consisting of a mixture of alpha and gamma phases. No. 2,380,506. Matthew Donachie to The Beryllium Corp.  
**Condenser for condensing zinc content of high velocity zinc vapor-gas streams** from a blast furnace using pure oxygen as supporter of combustion of reduction reactions. No. 2,380,548. Augustin Queneau to United States Steel Corp. of Delaware.  
**Preparing molten beryllium-copper alloys** for casting. No. 2,380,566. Francis Wyllie to Berks County Trust Co.  
**Concentrating nonmetallic ore values** from ores containing acidic silicious gangue, which comprises subjecting pulp of ore to froth flotation in presence of collector. No. 2,380,698. David Jayne, Jr. and Harold Day and Elmer Gieseke to American Cyanamid Co.  
**Chromium-free air-hardening alloy steels** and articles of manufacture produced therefrom. No. 2,380,711. Enrique Touceda and Ralph DeVries to Allegheny Ludlum Steel Corp.  
**Magnesium base alloy** containing manganese and calcium, balance being magnesium. No. 2,380,838. Joseph Hanawalt to The Dow Chemical Co.  
**Improving mechanical properties of cast magnesium-base alloys** which comprises agitating molten metal with gaseous oxide of carbon to effect desired improvement. No. 2,380,863. Charles Nelson and Graydon Holdeman to The Dow Chemical Co.

*Additional patents on all other classifications from the above volumes will be given next month.*

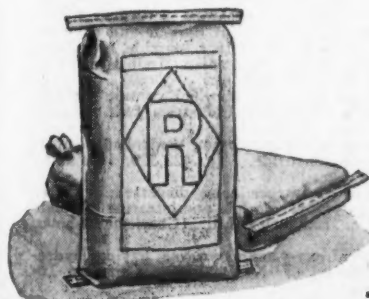


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## Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada.

### CANADIAN PATENTS

#### Granted and Published April 24, 1945 (Continued)

- Process for the preparation of sulphurized hydrocarbons, from monoolefin hydrocarbons and sulphur at 100° to 200° Cent. No. 426,999. Canadian Industries Ltd. (Jas. Herbert Werntz)
- Preparation of hydroxysulfonic acids, by treatment of monomeric polysulfide (see preceding patent)—with nitric acid. No. 427,000. Canadian Industries Ltd. (Jas. Herbert Werntz)
- Method of manufacturing highly twisted and sized polyhexamethylene adipamide yarn. No. 427,002. Canadian Industries Ltd. (John Blanchard Miles Jr.)
- Cyclized rubber, having deformation point in range of 30°-105° Cent., adaptable to manufacture of moisture proof lacquer for cellulose base wrapping, soluble in two per cent acetic acid and organic solvents. No. 427,003. Canadian Industries Ltd. (Wm. Hale Charch)
- Polymerization of methyl methacrylate, by means of irradiation with 1700 to 7000 Angstrom light, employing diacetyl as photopolymerization catalyst. No. 427,004. Canadian Industries Ltd. (Courtland Le Verne Agre)
- Process for polymerizing ethylenically unsaturated compound, by irradiating with 1800 to 7000 Angstrom light, including methyl methacrylate and from 0.01 to 1.0 per cent acetoin. No. 427,005. Canadian Industries Ltd. (Courtland Le Verne Agre)
- Cementing transparent solid polymers, such as vinyls and vinylidenes, by interposing between two layers, fluid, polymerizable methyl methacrylate containing 0.01 to 1.0 per cent benzoin, and irradiating. No. 427,006. Canadian Industries Ltd. (Robert Edward Christ)
- Abrasive product, and method of manufacture, composed of alpha alumina in matrix of artificial spinel. No. 427,016. Carborundum Co. (Henry Nicholas Baumann Jr., Raymond C. Benner)
- Manufacture of clean steel by addition of 0.01 to 1.0 per cent cerium to molten bath of killed steel, and casting into ingots. No. 427,017. The Cerium Corporation. (Harold E. Phelps)
- Method of treating yarns, when wound on a core, to impregnate with wax. No. 427,049. Ontario Research Foundation (Geo. Dykeman, Alfred C. Goodings)
- Reduction of iron impurities in sand, alumina, feldspar, calcite, dolomite, magnesite, fluorspar, or cryolite, by treating mineral in aqueous solution containing titanous sulphate, and a fluorine compound, and washing. No. 427,051. Pilkington Brothers Ltd. (Albert Sherlock)
- Preventing deposition of material in spinning jet orifices, in the manufacture of filaments from cellulose acetate-acetone, by incorporation of 0.1 per cent aluminum hydrate in spinning solution. No. 427,117. Camille Dreyfus, George Schneider.
- Production of artificial filaments, yarns, foils, films, or shaped articles, by shaping or molding in fused condition a solution consisting of 72 per cent polyamide formed by condensing hexamethylene diamine with adipic acid and 28 per cent formic acid, and setting shaped or molded solution. No. 427,118. Henry Dreyfus (Robert Wighton Moncrieff, Chas. Wm. Summers)
- Catalytic conversion of carbon monoxide and hydrogen into hydrocarbons containing more than one C atom in which the excess of reaction heat is removed by indirect heat exchange. No. 427,119. I. G. Farbenindustrie Aktiengesellschaft (Gustav Wirth, Wilhelm Wenzel, Franz Sabel, Hans Laudenklos)
- Manufacture of sodium and potassium hydride by vaporizing said metal in an electric arc between liquid alkali metal electrodes in presence of hydrogen maintained at about 300° Cent. No. 427,120. Friedrich Siegmann.

#### Granted and Published May 1, 1945

- Urea formaldehyde molding composition composed of: urea, 37; formaldehyde, 100; cellulose, 30; phenyl salicylate, 0.5 to 1.5; glycerine, 1.0 to 1.5; zinc stearate, 1.5; salicylic acid, 0.5; part by weight. No. 427,125. Neville E. Challenger.
- Method of manufacturing flame-coloring chemical units. No. 427,129. Jonathan P. B. Fiske.
- Enhancing olive flavour in "olive oil," with white mineral oil addition, by addition of 75 parts per million of benzaldehyde. No. 427,143. Sidney Musher.
- Production of hard, adherent, and adsorptive oxide coating on aluminum particles, by treating in aqueous bath of metal carbonate and alkali metal chrome glucosate. No. 427,152. Aluminum Co. of America (Orry Le Roy Shawcross)
- Preparation of fur for felting by employment of carroting solution containing: sulphuric acid, 0.5; chloric acid, 1.0; nitric acid, 0.5; hydrogen peroxide, 1.0 in parts by weight. No. 427,156. American Hatters and Furriers Co. Inc. (Warren G. Mercier)
- Copolymer of a soluble, fusible, heat-hardenable polymer of divinyl benzene and an unsaturated alkyl resin. No. 427,167. Canadian General Electric Co. Ltd. (G. F. D'Alelio)
- Electrically welding sulphur-banded steel by blanketing welding zone with prefused composition of 30-65 per cent MnO, 9-40 per cent alumina, and balance silica. No. 427,188. Dominion Oxygen Co. Ltd. (Wilber B. Miller)
- Wall adapted for radiant heating composed of rubber and 25-50 per cent conducting carbon black, and means for connecting to source of elec-

- trical energy. No. 427,190. Dominion Rubber Co. Ltd. (Arthur Walker Bull, Glenn George Havens)
- Improved method of manufacturing viscose rayon. No. 427,212. Industrial Rayon Corp. (Arthur F. F. Mothwurf)
- Preparation of lactone of 2-alkyl-3-alkoxy-4-hydroxymethyl-5-carboxypyridine by alkylating lactone of 2-alkyl-3-hydroxy-4-hydroxymethyl-5-carboxypyridine in presence of an organic solvent. No. 427,215. Merck & Co. Inc. (Stanton A. Harris)
- Production of substitute pyridine compounds by reacting 2-methyl-3-amino-4-ethoxy-methyl-5-aminomethylpyridine with concentrate hydrobromic acid and treating reaction product with silver and water. No. 427,216. Merck & Co. Inc. (Stanton Avery Harris)
- Froth-flotation method for concentration of sylvinite from ore containing same. No. 427,218. Mineral Separation North American Corp., assignee of Phosphate Recovery Corp. (Allen T. Cole, Jas. B. Duke, Karl F. Schilling)
- Manufacture of pyridinecarboxylic acid by oxidation of sulphate of pyridine-containing compound, of class of alkyl pyridines, quinoline, isoquinoline, and alkyl quinolines, with nitric acid at elevated temperatures. No. 427,240. Reilly Tar & Chemical Corp. (Wm. R. Wheeler)
- Improved guayule rubber obtained by heating in a solution of caustic at 150 Cent. No. 427,261. Wingfoot Corp. (Albert Joseph Gracia)
- Compound of group consisting of 3-cyano-6-methyl-5-nitro-2-pyridone-4-carboxylic acid, its N-alkyl-substitution products and alkyl esters of said carboxylic acids, and process of manufacture. No. 427,270. Hans Henecka.

#### Granted and Published May 8, 1945

- Laminated pulp product in which laminates are bonded by viscose applied in the form of a neutral solution and then precipitated. No. 427,281. Alfred Crustin.
- Molding dense, moisture-containing, grainless, ligno-cellulose fibre board by heated dies, perforated to permit release of steam. No. 427,283. Herbert C. Dee.
- Commercial fruit juice and pulp expressing apparatus design. No. 427,291. David Allan Hyslop.
- Method of manufacturing metal-sheathed, refractory insulated, electrical conductor, by forming thick metal sheath and then elongating. No. 427,303. Edwin Gilbert L. Roberts.
- Gas condensing apparatus comprising hollow rotary casing turning about vertical axis, with top valve-controlled outlet for escape of air and non-condensables, and bottom condensate outlet. No. 427,307. Grover S. Sargent.
- Breather type roof for gas and liquid tanks. No. 427,311. John Henry Wiggins.
- Producer gas cleaner design. No. 427,316. Aktibolaget Elektrolux (Per Emil Perman)
- Analysis of gas to determine NO content, by converting NO to NO<sub>2</sub> and measuring resultant change in light absorption characteristics photometrically. No. 427,320. American Cyanamid Co. (Robt. H. Park, James K. Dixon)
- Paper sized with wax-urea-formaldehyde resin mixture and having water-insoluble calcium stearate coating rendering paper easily separable from adhesive substances in contact therewith. No. 427,322. American Cyanamid Co. (Chas. H. Maxwell, Walter H. Thomas.)
- Rubber insulating coating composed of vulcanizable rubber and 0.5 to 5.0 per cent rubber oil as plasticizer. No. 427,330. Anaconda Wire and Cable Co. (Mark E. Ballard)
- Molding article by admixing 3-35 parts phenol-aldehyde, 95-65 parts fibrous material, compacting, and heating to softening but not curing temperature of resin to form oversize article, coating with thermo-setting resin, and molding to size. No. 427,334. B. B. Chemical Co. of Canada Ltd. (Thomas Clifton Morris)
- In electrodeposition of zinc, the steps of electrolyzing a free acid, zinc containing solution at current density of 1600-3600 amperes per square foot of cathode surface, with solution temperature maintained at least as high as 49 Cent. No. 427,338. Bethlehem Steel Co. Richard Marks Wick)
- Preparation of flocculose vinyl chloride polymers by agitation of the halide in a closed system in aqueous solution containing 0.25-5.0 per cent of polymeric acrylic or methacrylic acid, or interpolymers of said acids. No. 427,347. Canadian Industries Ltd. (L. B. Morgan, Wm. McG. Morgan)
- Sulphonation process embodying reacting non-gaseous saturated hydrocarbon in liquid state with admixed gaseous sulfur dioxide and chlorine, extracting sulphonyl chlorides with liquid sulfur dioxide, removing solvent, and hydrolyzing. No. 427,348. Canadian Industries Ltd. (Clyde Overbeck Henke, Frank McG. Schofield)
- Air filter comprising porous structure the pores of which contain glyceryl ammonium sulphate. No. 427,349. Canadian Industries Ltd. (Martin Eli Cuper)
- Process for preparation of sulphonic acids employing controlled temperature reaction of oleum and acetic anhydride. No. 427,350. Canadian Industries Ltd. (Frank O'Neil Cockerille)
- Stable emulsion comprising solution of nitrocellulose dispersed in water phase containing water-soluble polyvinyl alcohol and stearate chromic chloride. No. 427,351. Canadian Industries Ltd. (Charles Bushman Hemming)
- Process for manufacture of a 2-hydroxy-4-aminopyridine having hydrocarbon substituents on carbons 5 and 6. No. 427,352. Canadian Industries Ltd. (Geo. Wayne Rigby)

Vinyl acetate-chloride copolymer base phonograph record containing vegetable charcoal, inorganic filler, and plasticizer. No. 427,358. Carbide and Carbon Chemicals Ltd. (Victor Yngve)

Phonograph record composition essentially vinyl chloride-acetate copolymer, 75 to 40 parts 200 mesh wood flour, and 25–60 parts diatomaceous earth. No. 427,359. Carbide and Carbon Chemicals Ltd. (Victor Yngve)

Vinyl chloride-acetate molding composition with 5–25 per cent conjoint polymer of retene as plasticizer, with plasticity at moulding temperature greater than, and softening temperature not materially lower than, composition without plasticizer. No. 427,360. Carbide and Carbon Chemicals Ltd. (Victor Yngve)

Phenol-formaldehyde resin composition free from amine substituent in hardenable form, employing sulfamic acid as accelerator to cause hardening at room temperature. No. 427,361. Carbide and Carbon Chemicals Ltd. (Rupert S. Daniels)

Viscose thread manufacture by extrusion of viscose into aqueous coagulating solution containing sulfuric acid, and at least one metallic salt, in presence of 2-undecylimidazole or 2-undecylbenzimidazole. No. 427,363. Courtaulds Ltd. (Edwin Holroyd Sharples)

Hot-melt coating composition, comprised essentially of ethyl cellulose, 12-hydroxy stearin, oil-soluble phenol-formaldehyde, paraffin wax, in stated proportions. No. 427,373. The ow Chemical Co. (Toivo A. Kauppi, Earl L. Kropscott)

Apparatus for continuous coating of boards with bitumen felt. No. 427,391. Gyproc Products Ltd. (Joseph Francis Strable)

Pulp digester design for sulphite process. No. 427,403. Paper Patents Co. (Walter H. Swanson)

Drying freshly tanned hides by stretching, freezing, and removing most of water at sub-freezing temperature. No. 427,441. United Shoe Machinery Co. of Canada Ltd. (Wallace Milton Cutler)

Liquid evaporating and distilling method and apparatus to facilitate evaporation of liquid below its boiling point by gas admixture. No. 427,456. Society of Chemical Industry in Basle and L. von Roll Aktiengesellschaft fur Kommunale Anlagen. (Casimir Theiler, Werner Ludin)

### Granted and Published May 15, 1945

In electrolytic production of hydrogen and oxygen using caustic alkali electrolyte containing impurities tending to raise operating voltage of the cell, reducing cell voltage by addition of vanadium to electrolyte. No. 408,311. The Consolidated Mining and Smelting Co. of Canada Ltd. (Brian Porter Sutherland, J. B. Thompson, C. H. Simpkinson, D. D. Morris). Withheld from publication Nov. 3, 1942.

Production of gaseous fuel of high calorific value, by partial burning of producer gas, heating regenerator thereby, admixing oil with the gas and cracking. No. 427,488. Michael Steinschlaeger.

Manufacture of guanyl urea formate by reaction of dicyandiamide with formic acid. No. 427,499. American Cyanamid Co. (David W. Jayne Jr., Harold M. Day.)

Preparation of guanidine ferrocyanide by reacting saturated solution of alkali metal ferrocyanide with guanidine carbonate. No. 427,501. American Cyanamid Co. (Uerner Liddel)

Symmetrical di-2-octyl guanidine. No. 427,502. American Cyanamid Co. (I. Hechenbleikner)

As new compounds, bornyl ethyl cyanamide, bornyl phenyl cyanamide, and fenchyl benzyl cyanamide. No. 427,510. American Cyanamid Co. (Richard O. Robling, Jr.)

Resinous melamine, formaldehyde, bis-triazine reaction product. No. 427,520. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Heat curable resin obtained by condensation of aldehyde and carbamido-methyl derivative of a 2,4,6-triamino, 1,3,5-triazine. No. 427,521. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Production of rutile titanium dioxide pigments from titanium sulphate solutions by precipitating orthotitanic acid, purifying, dissolving in HCl, hydrolyzing, and calcining. No. 427,526. Canadian Industries Ltd. (Robt. Myers McKinney, Henry Morono Stark)

Process for production of uncalcined, anhydrous titanium oxide of fully developed pigment properties by hydrolyzing titanium salt at 350 to 450 Cent. in closed vessel and under solution pressure. No. 427,527. Canadian Industries Ltd. (John Lewis Keats)

Chalk resistant titanium pigment comprising particle of titanium pigment intimately associated with chromium hydrate, titanium nitrate, and aluminum hydrate. No. 427,528. Canadian Titanium Pigments Ltd. (Walter Kenneth Nelson)

Imitation mother of pearl composed of plastic base such as cellulose acetate, casein, phenol formaldehyde, or urea formaldehyde, having incorporated therein crystalline, silky, manganous ammonium phosphate. No. 427,559. Canadian Celanese Ltd. assignee Celluloid Corp. (Amerigo F. Caprio)

Improved process for production of aqueous magnesium chloride liquors by carbonating slurries of mixed hydrates of magnesium and calcium in aqueous calcium chloride. No. 427,562. The Consolidated Mining and Smelting Co. of Canada Ltd. (George Gerald Day)

Purification of latex by creaming, treating with caustic, and dialysing. No. 427,599. Gouvernements Landbouwbedrijven (Hendrik Roeloff Braak)

### Granted and Published May 22, 1945

Apparatus for stratification of mixtures of materials of different specific gravities by air current oscillation. No. 427,609. Jean Albert Brusset.

Process for production of adipic acid dinitrile by reaction of adipamide and acetic anhydride, and distillation. No. 427,611. Henry Dreyfus.

Manufacture of cellulose from cellulose containing material by treatment with dilute alkali at elevated temperature, hydrogen peroxide in presence of acetic acid containing manganese acetate, then subjecting to dilute alkali. No. 427,612. Henry Dreyfus.

Pressure release for liquid containers. No. 427,615. Arthur Percival Mansoff.

Metal nail coating composed of: 86 parts cumar CX grade; 155 parts gilsonite; 2–8 parts plasticizing oil; 125 parts asbestos; and 75–80 parts red iron oxide. No. 427,632. The American Steel and Wire Co. (Willis E. Boak)

Acid-curing, thermosetting resin, essentially triazinil carboxy-alkyl sulfide. No. 427,640. Canadian General Electric Co. Ltd. (G. F. D'Alelio, James W. Underwood)

Improved process for production of high-carbon ferro-chromium. No. 427,647. Chromium Mining and Smelting Corporation Ltd. (Leo H. Timmins)

Improved process for production of magnesium chloride liquors by car-

bonation of aqueous slurries of magnesium and calcium hydrates containing calcium chloride. No. 427,648. The Consolidated Mining & Smelting Co. of Canada Ltd. (Robt. B. MacMullin, G. G. Day)

Alkali cleaning composition containing 70–94 per cent sodium hydroxide; 20–4 per cent anhydrous sodium pyrophosphate; 10–2 per cent crystalline sodium orthophosphate. No. 427,652. The Diversay Corporation (Canada) Ltd. (Harry H. Hull, Jos. Janota)

Rubber anti-oxidant, essentially reaction product of 1,3 dimethyl 1,3 butadiene and 4,4-diamino diphenyl methane. No. 427,656. Dominion Rubber Co. Ltd. (Louis Harold Howland, Philip T. Paul)

High wet-strength paper, made by admixture of up to 5 per cent locust bean gum with pulp furnish, and alkalizing resultant paper with borax solution. No. 427,693. Reconstruction Finance Corp. assignee of Brown Co. (Milton Oscar Schur)

Age resistant rubber obtained by vulcanization in presence of reaction product of aryl amide and aliphatic ketone at 150–300 Cent. No. 427,715. Wingfoot Corp. (Winfield Scott)

Plasticizing butadiene-styrene copolymer by milling methyl alcohol into same. No. 427,717. Wingfoot Corp. (Harry Howard Thompson)

Manufacture of wetting, detergent and sudsing agents, consisting of water-soluble salts of sulfuric acid esters of hydroxy ethyl, acyl amide, with acyl group having 8 to 18 carbon atoms, by condensing comparable carboxylic acid chloride with monoethanol amine, sulphating, and neutralizing. No. 427,726. Heinrich Bertsch.

Treatment of ferro-titaniferous ores, by initial reduction of iron oxides to metallic iron, with subsequent thermal oxidation, separation, and recovery. No. 427,727. Andreas Johan Ravnstad, Olav Moglebust.

### Granted and Published May 29, 1945

Elutriation method and apparatus for the recovery of gold from ores. No. 427,734. John Broatch.

Production of N-diethyl-ethylene diamine salt of sulfuric acid ester of lauryl alcohol, by heating lauryl alcohol with acid sulfate of N-diethyl-ethylene amine at 130–170 Cent. No. 427,740. Henry Dreyfus.

Disintegrating fibrous material employing liquid bath and gas under pressure to remove fibre binder, and filtering. No. 427,760. Harry Ewart Partridge.

Ammonia treatment for separation of monocarboxylic acids, anhydrides, and dicarboxylic anhydrides, from a mixture of same containing at least one polybasic acid. No. 427,784. American Cyanamid Co. (Wm. H. Hill)

Recovery of aromatic alkali metal sulphonates, and heterocyclic alkali metal sulphonates, from crude sulphonation mixtures, by treatment with ammonia, and filtering. No. 427,785. American Cyanamid Co. (Wm. H. Hill)

Acyl dicyandiamides, salts thereof, and method of preparation. No. 427,788. American Cyanamid Co. (Donald W. Kaiser, J. T. Thurston)

Method of preparing alkyl, aryl, and cycloalkyl esters of carboxydicyandiamides. No. 427,790. American Cyanamid Co. (J. T. Thurston, D. W. Kaiser)

Dielectric and insulating composition composed of 60 to 99 parts of halogenated diphenyl benzene and 40 to 1 part of halogenated ortho halophenyl. No. 427,800. Canadian General Electric Co. Ltd. Frank M. Clark)

Solid dielectric composition, suitable for use in capacitors, basically, 2 parts diphenyl benzene; 1 part diphenyl; 1 part naphthalene. No. 427,801. Canadian General Electric Co. Ltd. (F. M. Clark)

Polyvinyl acetal, or butyral films, softened with carboxylic acid diester of octadecanediol, to increase durability, flexibility, and tear resistance, and rendering possible close sewing in fabrication. No. 427,803. Canadian Industries Ltd. (Emmette Far Izard)

Improved method for injection molding of toothed articles. No. 427,804. Canadian Industries Ltd. (Earl Roscoe Person)

Textile finishing process employing textile finish applied as positively charged aqueous dispersion from dilute aqueous suspension by process of exhaustion, and method of retarding rate of exhaustion. No. 427,805. Canadian Industries Ltd. (Jos. E. Smith)

Froth flotation method for concentration of metal carbonate and oxide ores, employing cationic surface active agent, and tannic, pectic, alginic acids, or their salts. No. 427,806. Canadian Industries Ltd. (J. E. Kirby)

Concentrating negatively charged minerals from ores by froth flotation, involving use of cationic surface active agent, and water-soluble open chain carboxylic acid of up to 9 carbon atoms. No. 427,807. Canadian Industries Ltd. (J. F. Lontz)

Bonding methacrylate polymer by cementing action of monomeric methacrylic acid. No. 427,808. Canadian Industries Ltd. (Richard E. Leary)

Method of incorporating finely divided solid pigment in molten synthetic linear polyamide. No. 427,809. Canadian Industries Ltd. (Geo. De Witt Graves)

Improved cellulose acetate powder-producing process, comprising dry pressing acetate at 10,000 to 40,000 pounds per sq. in., and grinding tablets so formed. No. 427,810. Canadian Industries Ltd. (Bruce S. Farquhar)

Manufacture of alpha-phenyl-acrylonitrile by passing acetophenone cyanhydrin, containing less than 0.1 per cent hydroquinone, through tube at 365–375 Cent., and fractionally distilling at reduced pressure. No. 427,811. Canadian Industries Ltd. (V. M. Weinmayr)

Curable neoprene composition, containing litharge and butyraldehyde-monoethylamine, as accelerator. No. 427,812. Canadian Industries Ltd. (L. S. Bake)

Elastic, resilient, rubber-like moulded article, containing no water, formed of partial acetate of polyvinyl alcohol, and tereethylene glycol containing 4 to 20 carbon atoms—35 to 50 per cent of former; 65 to 50 per cent of latter. No. 427,813. Canadian Industries Ltd. (H. M. Sonnichsen)

Fused bath for removing metal oxides from ferrous metals, composed of sodium hydroxide, soda amide, and sodium hydride. No. 427,814. Canadian Industries Ltd. (H. N. Gilbert)

Predoped aeroplane fabric, of improved suppleness, prepared by application of cellulose nitrate, water dibutylphthalate, castor oil, methyl ethyl ketone, emulsion of stated proportions. No. 427,815. Canadian Industries Ltd. (Robt. L. Lester)

Method of preparation of beta-hydromucononitrile by reacting 1,4 dibromobutene-2 or 1,4-dichlorobutene-2, with alkaline metal cyanide. No. 427,817. Canadian Industries Ltd. (O. W. Cass, A. O. Rogers)

Aeroplane fabric dope composed of cellulose nitrate, 29.0 per cent; castor oil, 5.8 per cent; polyvinyl alcohol, 0.6%; isopropyl naphthalene sulfate, 0.2 per cent, and volatile vehicle. No. 427,818. Canadian Industries Ltd. (A. Dreyling, C. W. Johnson)

Rubber hydrochloride composition containing a trialkyl trimethylene triamine as stabilizer. No. 427,832. Dominion Rubber Co. Ltd. (G. E. Hulise, Jr.)

Manufacture of gas-expanded rubber by means of thermal decomposition products of zinc diammonia nitrite, obtained by heating rubber composition containing same. No. 427,834. Dominion Rubber Co. Ltd. (W. Vandervort)

Rubber antioxidant, composed of neutral product of thermal reaction of acetone, aliphatic monohydric hydrocarbon alcohol, and diphenylamine, in presence of acidic catalyst, with elimination of water. No. 427,835. Dominion Rubber Co. Ltd. (P. T. Paul)

Production of rubber goods from aqueous dispersions which embody admixture of sodium silicofluoride with dispersion. No. 427,838. Dominion Rubber Co. Ltd. (D. F. Twiss, P. H. Amphlett)

Zinc recovery method, embodying roasting the ore, leaching with sulphuric acid, precipitating silica and iron, separating zinc sulphate and purifying with manganese metal. No. 427,841. Enca Exploration and Development Co. Ltd. (Wm. E. Harris)

Sealing tape adhesive composed of asphalt emulsion, 20 parts; Burgundy pitch, 3 to 6 parts, wherein asphalt emulsion contains 50 per cent solids, plastic at 140 Fahr., dispersed in water. No. 427,857. McLaurin-Jones Co. (L. Davis, A. J. Gauthier)

Waterproof, meltable, sealing tape adhesive, composed of asphalt, Piolite, and Gelva, to make coating hard dry, and non-tacky at high atmospheric temperatures and humidities. No. 427,858. McLaurin-Jones Co. (L. Davis, E. C. Tuukkanen) Method of manufacturing laminating plastic material. No. 427,867. Pilkington Bros. Ltd. (C. F. Griffith, P. R. Bradley)

Method of depositing film of aluminum or magnesium, with a bright surface, on a support of paper, cellophane, etc. by thermal metal vaporization and deposition, in vacuum. No. 427,904. Vapco Ltd. (P. Alexander, E. L. Cranstone)

Preparation of fibrous paper articles, employing urea, formaldehyde, and lactic acid, to improve wet strength. No. 427,910. Jesse B. Hawley E. C. Sloan, A. H. Eberman)

### Granted and Published June 6, 1945

Treating cellulose-derivative artificial sponges at 90 Cent. and 100 lbs. sq. in. to decrease thickness without increase in surface dimensions. No. 427,919. Cyril Victor Barker

Alkali metal chloride flux consisting of: 3—25 parts cryolite; 0.5—15 parts lithium fluoride; 2—15 parts strontium chloride; 5—60 parts sodium chloride; 5—60 parts potassium chloride; 5—80 parts lithium chloride. No. 427,950. Aluminum Laboratories Ltd. (M. A. Miller)

Shrinkproof paper formed by treatment with resin-forming methylol—such as furfurylalcohol—and method of manufacture. No. 427,953. American Reinforced Paper Co. (F. F. Newkirk)

Nail coating composition, basically; 70 parts fine melt Congo resin, 30 parts gilsonite; 2—20 parts plasticizer. No. 427,954. The American Steel and Wire Co. of N. J. (W. E. Boak)

Explosive cartridge, constructed with shell laminations bonded with glue rendered water repellent by treatment with formaldehyde. No. 427,973. Canadian Industries Ltd. (N. G. Johnson)

Soft solders, of stated tin, lead, silver ratios. No. 427,975. Copper Pass and Son Ltd. (P. G. J. Gueterbock)

Thermoplastic molding compositions formed by mixing one part wood pulp with ten parts alkaline black kraft or soda pulp liquor, precipitating lignin in situ, and washing. No. 427,979. Consolidated Paper Corp. Ltd. (J. A. Hamblly)

Manufacture of electrical condenser plates by application of organic liquid-metal compound to a dielectric, and firing to decompose and produce metal film. No. 427,997. Johnson, Matthey & Co. Ltd. (E. R. Box)

Bonding cellulosic material, by applying coating of water-soluble, partially hydrolyzed polyvinyl acetate resin, of acetate group content—20-50 per cent, and heating for short period at 150-200 Cent. No. 428,023. Shawinigan Chemicals Ltd. (Geo. O. Morrison, Thos. P. G. Shaw)

Solution to prepare iron for painting consisting of phosphorous acid, and organic phosphate or phosphonate, wetting agent. No. 428,041. Clete L. Boyle (Martin D. Sclar)

Films and sheets impermeable to ultraviolet, composed of plastic base having incorporated therein a benzalacetophanone compound. No. 428,044. Camille Dreyfus (Wm. Horback)

### Granted and Published June 12, 1945

Free-flowing, dispersible thiocarbamide powder, coated with licorice root and admixed with wetting agent. No. 428,080. American Cyanamid Co. (D. W. Jayne Jr.)

Process for the manufacture of tin-plated lead collapsible tubes. No. 428,089. Betts & Co. Ltd. (E. Stather-Dum)

Melamine-aldehyde reaction product resin. No. 428,098. Canadian General Electric Co. Ltd. (G. F. D'Alelio, Jas. W. Underwood)

Heat-curable resin, comprising reaction product of urea, formaldehyde, and 4,6-diamino pyrimidyl-2 thio acetyl urea. No. 428,099. Canadian General Electric Co. Ltd. (G. F. D'Alelio)

Manufacture of dense, cellulosic boards, by fibrating wood, suspending in water, incorporating therein partially oxidized soybean oil, drying, and pressing at 350 to 450 Fahr. No. 428,103. Canadian Gypsum Co. Ltd. (Jesse R. Newberry)

Liquid coating composition stabilized against gelation in storage comprising dispersion in aqueous ammonia of styrene-maleic anhydride-polyalkylene glycol conjoint polymer. No. 428,117. Carbide and Carbon Chemicals Ltd. (Wm. N. Stoops, Walter A. Denison)

Manufacture of pure melamine, from raw materials containing melamine, by delivering raw material to surface heated to 350-450 Cent., and removing melamine vapour by gas currents, and recovering. No. 428,122. Ciba Products Corp., assignee of Society of Chemical Industry in Basle (Gustave Widmer, J. Jakl, Willi Fisch)

Continuous process for producing ammonium sulphate and sulphur from ammonium bisulphite and ammonium thiosulphate solutions added to saturated ammonium sulphate solution containing sulfuric acid, at high temperature, under superatmospheric pressure. No. 428,124. The Consolidated Mining and Smelting Co. of Canada Ltd. (R. Lepsoe, R. F. Mitchell)

Purification of manganous sulfate solutions by hydrogen sulfide-calcium carbonate treatment to eliminate metallic impurities. No. 428,125. The Consolidated Mining & Smelting Co. Ltd. (W. H. Hannly, B. J. Walsh)

Pressure sensitive adhesive composed of 15-40 per cent polystyrene and 85-90 per cent diphenyl mono-(6-chloro-2-xyenyl) phosphate. No. 428,127. The Dow Chemical Co. (C. F. Cummins, K. D. Bacon)

Process for manufacture of halogen-substituted acylaminosulphonic acids. No. 428,132. J. R. Geigy A. G. (Henry Martin, Rudolf Hirt, Hans Zaeslin)

Method of preparing sulphonic acid and N-substituted products. No. 428,133. J. R. Geigy A. G. (Achille Conzetti)

Production of transfer paper by application to gummed backing paper of acetone solution of cellulose nitrate or acetate, and coloring material. No. 428,139. Johnson, Matthey & Co. Ltd. (E. R. Box, F. E. Kerridge)

Plastic rivet. No. 428,148. Plastic Research Engineering Div. of Victory Mfg. Co. (Henry Kearns)

Composite lead chromate-metal silicate, co-precipitated, pigment, and method of manufacture. No. 428,156. Sherwin-Williams Co. (N. F. Livingston)

Process for recovery of cellulose acetate and acetic acid from solution of former in latter, by precipitating cellulose acetate by means of ammonium sulfate-acetic solution, and removing acetic by use of water-immiscible solvent for same. No. 428,179. Henry Dreyfus (W. H. Groombridge, R. Page)

Cyclic process as in 428,179 employing sodium sulfate instead of ammonium sulfate. No. 428,180. Henry Dreyfus (W. H. Groombridge)

Bearing composition containing lead-indium of 0.5 to 10 per cent indium content. No. 428,264. The Indium Corp of America (Wm. S. Murray)

Method of determining and evaluating receptivity of sheet material to coatings, inks, etc. No. 428,265. The Institute of Paper Chemistry (B. W. Rowland, D. Frommuller, J. A. Van den Akker)

Manufacture of water-soluble theophylline derivatives, including 2-amino-butanol, butanolamine, and 2-amino-2-methyl-1-propanol salts. No. 428,272. Wm. S. Merrell Co. (Robt. S. Shelton)

Friction element in which is incorporated wire cloth coated with urea-formaldehyde resin, resistant to cracking on bending, and stable at 400 Fahr. No. 428,282. Raybestos-Manhattan Inc., assignee of Gilbert and Bennett Mfg. Co. (D. H. Miller, P. H. Knowles, W. A. Hughes)

Manufacture of improved bonded fibrous materials by impregnation of fibres with solution of low molecular weight aldehydic condensation product, furthering condensing within the fibre, and forming with thermoplastic bonding agent. No. 428,291. Tootal Broadhurst Lee Co. Ltd. (E. R. Angel)

Attrition mill design. No. 428,300. Augustin Leon Jean Queneau

Method of recovery of cellulose acetate particles from acetic acid solution thereof, by precipitation, and washing. No. 428,306. Camille Dreyfus (Geo. Schneider)

Method of manufacturing sucrose octa acetate, by acetylating with sodium acetate as catalyst, removing part excess acetic anhydride and acid by distillation, and remainder by alkali neutralization. Camille Dreyfus (Geo. W. Seymour)

In production of hydrocarbons of more than one carbon atom per molecule by catalytic reaction of carbon monoxide and hydrogen, in consecutive reaction vessels, improvement of maintaining in all reaction vessels same throughout of gas per cubic meter of catalyst per hour. No. 428,309. I. G. Farbenindustrie Aktiengesellschaft (G. Wirth, F. Sabel, H. Laudenklos)

### Granted and Published June 19, 1945

Gasket material composed of polymerized chloroprene, magnesia, zinc oxide, litharge, mineral oil, lignin, and filler, in stated proportions. No. 428,194. Le Grand Daly

Chemical-containing fabric-based applicator for use in applying chemicals to trees for treatment of latter. No. 428,213. Frederick Richard Reevley

Pulp beater and selector design. No. 428,218. Harold Donald Wells

Method and apparatus for forming thermoplastic-bonded sheets of felts, etc. No. 428,227. American Felt Co. (Hugo Boeddinghaus)

Apparatus for forming and polishing flocculent insulating material on a wire. No. 428,235. Canadian General Electric Co. Ltd. (Geo. L. Lethiser)

Electrostatic dust sampler design. No. 428,238. Canadian Westinghouse Co. Ltd. (G. W. Penney, E. C. Barnes)

Ion generator for supplying high energy ions, employing heavy hydrogen. No. 428,243. Canadian Westinghouse Co. Ltd. (Jos. Slepian)

Woven textile fabric, having characteristics similar to those of synthetic fibre fabrics, composed of synthetic fibres and cotton, fabricated on cotton basis and stabilized to shrinkage. No. 428,258. Dominion Textile Co. Ltd. (E. F. King)

Graphite paste composition, suitable for manufacture of electrodes, bonded with coal tar and halogenated organic compound which reacts with and hardens the normally liquid tar. No. 428,259. The Dow Chemical Co. (Richard I. Thrune)

Manufacture of shaped articles from coke and pitch involving use of carbon tetrachloride addition, which reacts with pitch above initial melting point but below carbonizing temperature, shaping, and carbonizing. No. 428,260. The Dow Chemical Co. (E. R. Cole, Richard I. Thrune)

### Granted and Published June 26, 1945

Preserving or conditioning raw animal hides by employment of preparation containing wheat flour, neat's foot oil, salt, eggs, sodium bisulphite, sulphated alum, and formaldehyde. No. 428,312. Werner Schwarz, Jovan Mumizaba

Coating material, for application to metals, composed of reaction product of polyacrylic acids and fatty drying oils, in presence of vanadium pentoxide. No. 428,333. Paul D. Watson

Inactivation of styrene polymerization inhibitors in crude styrene drip oil by sulfuric acid—mercuric sulphate treatment, and distillation. No. 428,341. Allied Chemical and Dye Corp. (W. A. King, J. H. Kleiner, A. R. Kroetzer)

Apparatus for removing residual solvent from solids extracted by means of volatile solvents. No. 428,360. Canadian Industries Ltd. (A. A. Levine, O. R. Sweeney, C. E. Kircher Jr., W. L. McCracken)

High boiling, low freezing composition, essentially 50:50 dimethyl phthalate and dimethoxy tetraglycol. No. 428,362. Carbide and Carbon Chemicals Ltd. (Leon P. Jchle)

As new chemical compositions, diesters of endo-methylene hydrophthalic acid. No. 428,363. Carbide and Carbon Chemicals Ltd. (Chas. E. Staff)

Method and apparatus for drying paper pulp by infra red radiation in

vacuo. No. 428,378. Dominion Engineering Works Ltd. (Bernard A. Malkin)  
 Production of cellulose acetate by acetylating cellulose with acetic anhydride in presence of acetic acid and sulfuric acid and on completion of acetylation neutralizing part of sulfuric acid and ripening. No. 428,433. Camille Dreyfus (G. W. Seymour, B. B. White)  
 Preparation of cellulose acetate of improved stability by acetylation of cellulose by acetic-anhydride in presence of sulfuric acid, and employing partial neutralization of said acid by cellulose acetate-magnesium acetate addition, and ripening at 35 Cent. for 48 hours. No. 428,434. Camille Dreyfus (M. E. Martin)  
 Combined gas collector and cell cover for tank type electrolytic cell. No. 428,440. The Consolidated Mining and Smelting Co. of Canada Ltd. (E. A. G. Colls, A. W. Moore, D. D. Morris)  
 Textile fabric—impregnated with iodine and isinglass, and method of manufacture, said fabric being capable of releasing free iodine when moistened. No. 428,441. Charles Rudolf Hans Ritter.

### Granted and Published July 3, 1945

Manufacture of casein paint, by wet mixing paint pigment with casein solution, drying, and pulverizing the product to produce a dry paint. No. 428,464. Walter B. Kinney.  
 Sodium bentonite process for the clarification of water. No. 428,472. Hubert L. Olin.  
 Dielectric for electrostatic condensers composed of solid hydrogenated tree resin and chlorinated naphthalene. No. 428,476. Samuel Ruben.  
 Dielectric for electrostatic condensers composed of ethyl pentachlorobenzene, ethyl tetrachlorobenzene, and heat polymerized coumarone indene resin. No. 428,477. Samuel Ruben.  
 Cleaning aluminum surfaces by immersion in bath containing ammonium fluoride. No. 428,487. Aluminum Company of America (W. E. White)  
 Reaction product of aldehydes and poly-diazinyl hydrazino derivatives of polycarboxylic acids. No. 428,504. Canadian General Electric Co. Ltd. (G. F. D'Alelio, Jas. W. Underwood)  
 Catalytic hydrogenation of saturated aliphatic nitrile in presence of carboxylic acid ester to yield amides. No. 428,506. Canadian Industries Ltd. (M. W. Farlow)  
 Manufacture of methyl alpha-methyl-beta mercaptopropionate by autoclave reaction of hydrogen sulphide and monomeric methyl methacrylate. No. 428,507. Canadian Industries Ltd. (W. J. Burke, F. T. Peters)  
 Production of hydroxylamine salts by subjecting organic nitrite to pyrolysis, cooling in a quenching solution, adding mineral acid, and isolating hydroxylamine salt of the acid. No. 428,508. Canadian Industries Ltd. (R. M. Joyce, Jr.)  
 Process of reacting dimethyl maleate and an allyl alcohol by refluxing mixture in presence of metallic magnesium. No. 428,509. Canadian Industries Ltd. (B. E. Sorenson)  
 As new compound, 12-amino-stearamide, and process for preparation. No. 428,510. Canadian Industries Ltd. (M. W. Farlow)  
 Water-soluble cellulose preservative composition containing essentially: zinc chloride, cupric chloride, arsenic pentoxide, and sodium dichromate. No. 428,511. Canadian Industries Ltd. (assignee of E. I. du Pont de Nemours and Co. (W. P. Arnold, E. R. Boller)  
 Methallyl ether of dimethyl malate and process for production. No. 428,513. Canadian Industries Ltd. (H. S. Rothrock)  
 Preparation of monomeric methyl methacrylate of high purity from polymeric methyl methacrylate by vapourization of the polymer, condensation, and steam distillation. No. 428,514. Canadian Industries Ltd. (B. M. Marks)  
 Bonding fibrous material and metal by means of polyvinyl acetate film, with application of heat and pressure. No. 428,515. Canadian Industries Ltd. (E. J. Gentner)  
 Manufacture of nitrourea by treatment of urea nitrate with acetic acid and acetic anhydride at 30 to 70 Cent. cooling, and separating nitrourea. No. 428,516. Canadian Industries Ltd. (C. P. Spaeth)  
 Preparation of urea nitrate by dissolving urea in acetic acid, adding nitric acid, and separating precipitated urea nitrate. No. 428,517. Canadian Industries Ltd. (C. P. Spaeth)  
 Blasting cap containing charges of pentaerythritol tetranitrate and diazo-dinitrophenol. No. 428,518. Canadian Industries Ltd. (L. A. Burrows)  
 Blasting cap containing charges of erythritol tetranitrate and dinitrophenol. No. 428,519. Canadian Industries Ltd. (L. A. Burrows)  
 Process for catalytically isomerizing ricinoleic compound to 12-ketostearic acid derivatives by heating in presence of cobalt or nickel. No. 428,520. Canadian Industries Ltd. (H. W. Gray, W. E. Hanford, R. S. Schreiber)  
 Production of substituted hydroxy-acetamide by inter-reaction of methyl hydroxyacetate and ethanolamine. No. 428,521. Canadian Industries Ltd. (F. M. Meigs)  
 Inhibiting polymerization of vinyl ester by addition of 0.01 to 0.3 percent anhydrous ammonium salt of an organic carboxylic acid. No. 428,522. Canadian Industries Ltd. (A. Berne-Allen Jr.)  
 Rubber anti-oxidant—reaction product of N, N'-diphenyl p-phenylene diamine with a propylene oxide. No. 428,544. Dominion Rubber Co. Ltd. (P. T. Paul)  
 Use of an anilino-phenoxy aromatic acid, or salt thereof, as rubber anti-oxidant. No. 428,545. Dominion Rubber Co. Ltd. (E. J. Hart, R. T. Armstrong)  
 Bonding rubber to another material by means of intermediate bonding layer comprising rubber chloride and a 1,3 dithio 5,5-dialkyl hydantoin. No. 428,546. Dominion Rubber Co. Ltd. (C. M. Grafton)  
 Use of 4-cyclohexoxy phenyl beta naphthylamine as rubber anti-oxidant. No. 428,547. Dominion Rubber Co. Ltd. (P. T. Paul)  
 Insecticidal composition containing extract of pyrethrin and diallyl ester of an unsaturated dicarboxylic acid. No. 428,549. Dow Chemical Co. (G. H. Coleman, C. L. Moyle)  
 Preparation of cinchon alkaloid ascorbate by heating in organic solvent. No. 428,562. Hoffmann-La Roche Ltd. (Kurt Warnat)  
 Hair and scalp improving preparation containing pantothenic acid calcium salt. No. 428,563. Hoffmann-La Roche Ltd. (Otto Schneider)  
 Polysaccharide derivative prepared by reacting part of hydroxy groups of cellulose with chloro-sulphonic acid and etherifying sulphonic acid formed with chloro-acetic acid in alkaline solution. No. 428,564. Hoffmann-La Roche Ltd. (Max Walter)  
 Electron tube design. No. 428,607. C. Lorenz Aktiengesellschaft (Felix Herriger)

### Granted and Published July 10, 1945

Paint composition comprised of, Portland cement, 24 parts; linseed oil,

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14 parts; and magnesium carbonate to maintain cement in suspension. No. 428,610. (L. J. Howlett, W. H. Howlett)  
 Improvement of paper by treatment with aqueous dispersion of rubber-like reaction product of sulfur chloride and oils, and drying. No. 428,617. Ernest Bader.  
 Composition for preservation of cut flowers, by solution in feed water, containing: hydrazine sulphate, 23-43 parts; manganese sulphate and iron oxide, 42-82 parts; calcium hypochlorite, 3-5 parts; sugar, 3,125-5,125 parts. No. 428,634. August Albert Meyer.  
 Apparatus for frothing latex and permitting molding of frothed material of uniform cell structure. No. 428,640. Theodore A. Te Grotenhuis.  
 Brightening aluminum surfaces by making surface anode in an electrolyte consisting of 2 to 50 per cent hydrofluoric, 5 to 75 per cent glycerine or sugars, and not less than 10 per cent water. No. 428,644. Aluminum Co. of America (Martin Tosterud)  
 Diazine derivative. No. 428,660. Canadian General Electric Co. Ltd. (G. F. D'Alelio)  
 Triazine derivative. No. 428,661. Canadian General Electric Co. Ltd. (G. F. D'Alelio)  
 Preparation of alkylene polyamines by reacting ammonia with 1,2-alkylene imine. No. 428,670. Carbide and Carbon Chemicals Ltd. (Alex L. Wilson)  
 Preparation of beta-aminoalkyl nitrogen derivatives by reacting a 1,2 alkylene imine with non-acylated basic amine. No. 428,671. Carbide and Carbon Chemicals Ltd. (Alex L. Wilson)  
 Non-absorbable suture material containing a sulphonamide compound, and method of manufacture thereof. No. 428,673. Davis and Geck Ind. (W. K. Gillett)  
 Homogeneous rubber composition, containing large proportion or normally black-flocculable reinforcing black, in highly deflocculated state, and a quinone oxime compound. No. 428,680. Dominion Rubber Co. Ltd. (L. H. Howland)  
 Method of coating fabric with impervious coating, without impregnating textile threads, by wetting with alcohol and applying solvent coating material precipitated by alcohol. No. 428,682. Dominion Rubber Co. Ltd. (W. V. Ridge)  
 Reclaiming scrap containing vulcanized copolymer of butadiene-1,3 and monovinyl compound, by heating at 300 to 420 Fahr. in presence of a di (hydroxyaryl) sulphide. No. 428,683. Dominion Rubber Co. Ltd. (W. G. Kirby, L. E. Steidle)  
 Reclaiming scrap containing vulcanized polychloroprene, by heating at 300 to 420 Fahr. in presence of a di (hydroxyaryl) sulphide. No. 428,685. Dominion Rubber Co. Ltd. (W. G. Kirby, L. E. Steidle)  
 Manufacture of high molecular guanamines by heating at 170 Cent. upwards, an acyl-bisguanide containing minimum of 9 carbon atoms in acyl radical. No. 428,687. J. R. Geigy A. G. (Jakob Binder)  
 Mechanical process for the manufacture of tear-resistant rubber from raw rubber. No. 428,754. Wilkinson Rubber Linatex Ltd. and J. G. Ingram and Son Ltd. (Bernard Wilkinson, G. D. Ingram, H. Waumsley)

### Granted and Published July 17, 1945

Purification of lactoflavin by dissolving in acetone-water and crystallization therefrom. No. 428,759. Geo. E. Flanigan, Geo. C. Supplee.  
 Dehydration of castor oil by heating—phthalic anhydride treatment. No. 428,786. Armstrong Paint & Varnish Works (R. T. Urben, Jas. R. Price Jr.)  
 Dielectric material composed of tetrachlor orthonitro diphenyl derived by chlorination of mono orthonitrodiphenyl and pentachlor diphenyl. No. 428,798. Canadian General Electric Co. Ltd. (F. M. Clark)  
 Preparation of diazinil carboxy-alkyl sulphide and salts. No. 428,801. Canadian General Electric Co. Ltd. (G. F. D'Alelio, J. W. Underwood)  
 Diamino benzyl alcohol manufacture. No. 428,804. Canadian Kodak Co. Ltd. (J. B. Dickey, J. G. McNally)  
 Bonding agent for uniting rubber and metal which comprises rubber chloride in combination with rubber derivative obtained by the depolymerizing action of heat and oxygen on dissolved raw rubber in presence of 8 per cent sulfur, and vulcanization accelerator. No. 428,834. Dominion Rubber Co. Ltd. (O. H. Smith)  
 Polysaccharide derivatives, prepared by partly etherifying a polysaccharide with compound containing hydroxy and acid group, partly esterifying the partly etherified polysaccharide with halogeno-sulphonic acid, and reacting compound so formed with alkali. No. 428,839. Hoffmann-La Roche Ltd. (Paul Karrer)  
 Improving the durability of glass bottles by introduction of ammonium salts containing both sulfur and oxygen, and ammonium halides into the bottle, heating to release acid gases to react with internal surface of container, and cooling. No. 428,876. United Glass Bottle Manufacturers Ltd. (Eric Seddon)  
 Coating regenerated cellulose fabric with film-forming, plasticized, cellulose ester, and shrinking upon drying to form closely adherent coating. No. 428,890. Camille Dreyfus (Wm. Whitehead)  
 Conditioning fluid for textiles composed of mineral oil, oxidized vegetable oil, dibutyl and diamyl derivatives of phenol, acyl derivative of an ester of hydroxylated higher fatty acid. No. 428,892. Camille Dreyfus (G. W. Seymour, W. Brooks)  
 Recovery of lactoflavin from substances containing it and lactose by selective solubility treatment employing acetone-water. No. 428,894. Geo. E. Flanigan, Geo. C. Supplee)  
 Manufacture of nitrile compounds by inter-reaction of tertiary amino-methyl indol compound and hydrocyanic acid or salts thereof, in presence of inert diluent. No. 428,897. I. G. Farbenindustrie Aktiengesellschaft (W. Salzer, Hans Andersag)

### Granted and Published July 24, 1945

Producing gluten and starch from wheat by pre-treatment with sulphurous acid which eliminates conglomeration of gluten and expedites processing. No. 428,900. Cecil T. Langford, Richard L. Slotter.  
 Hair-waving method, embodying winding hair about cylindrical rod, spraying with plastic coating, and with second de-plasticizing chemical to cause tightening action on the rod. No. 428,905. Gladys Graham Barnett.  
 Hair-waving solutions, applicable to preceding patent No. 428,905, composed of thyoglycol, ammonia, sodium and water; sodium bromate and water. No. 428,906. Gladys Graham Barnett.  
 Process for the manufacture of ketols of saturated and unsaturated cyclopentanopolycyclohexanthrene series. No. 428,926. Tadeus Reichstein.

(To be continued)

# Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

415,161. Joseph Handler, as Mercer Oil and Chemical Co., Philadelphia, Pa.; filed Feb. 6, 1945; Serial No. 469,476; for fire extinguisher fluid; since December 1941.  
415,169. Wyandotte Chemicals Corp., Wyandotte, Mich.; filed Apr. 6, 1945; Serial No. 481,816; for caustic soda and soda ash composition; since March 1927.  
415,264. J. M. Huber, Inc., N. Y.; filed June 8, 1944; Serial No. 471,034; for carbon black and clay fillers; since Nov. 15, 1923.  
462,069. Croda Ltd., Goole, England; filed July 14, 1943; for solid alcohols and sterols from wool grease, used as emulsifying agent; since July 1, 1937.  
462,882. Imperial Chemical Industries Ltd., London, England; filed Aug. 20, 1943; for sizing, finishing and dressing; since June 26, 1937.  
463,589. Sylvania Industrial Corp., Fredericksburg, Va., and N. Y.; filed Sept. 22, 1943; for plasticizer for hydrophilic sheet materials; since Apr. 21, 1943.  
469,309. Phillips Petroleum Co., Bartlesville, Okla.; filed Apr. 13, 1944; for insecticide; since April 1933.  
469,386. The Diversey Corp., Chicago, Ill.; filed Apr. 17, 1944; for sterilizing and treating water; since Jan. 18, 1944.  
469,472. Pearce L. Meadows, as Elroy Naval Stores Co., Vidalia, Ga.; filed Apr. 19, 1944; for paint thinner; since Jan. 1, 1940.  
470,171. Bareco Oil Co., Tulsa, Okla.; filed May 12, 1944; for petroleum products; since January 1918.  
471,198. Sharples Chemicals, Inc., Philadelphia, Pa.; filed June 13, 1944; for substitution products of hydroxy aromatic hydrocarbons; since Mar. 6, 1944.  
472,785. Petrolite Corp., Ltd., St. Louis, Mo.; filed July 31, 1944; for rust inhibitor; since July 24, 1944.  
474,103. Synvar Corp., Wilmington, Del.; filed Sept. 11, 1944; for raw synthetic resins; since Jan. 15, 1940.  
474,847. Casper Lubricants, Inc., N. Y.; filed Oct. 3, 1944; for dissolving gum and carbon binding material; since Dec. 2, 1937.  
475,999. Benjamin D. Smith, as Smith Mfg.

Co., Utica, N. Y.; filed Nov. 1, 1944; for insecticides; since Sept. 1, 1944.  
476,035. The Staminite Corp., New Haven, Conn.; filed Nov. 2, 1944; to render fabrics waterproof; since Oct. 10, 1944.  
478,463. Allen G. Mason and Pierson B. Waller, Morganfield, Ky.; filed Jan. 10, 1945; for removing rust scale; since July 1944.  
478,906. Shell Union Oil Corp., San Francisco, Calif.; filed Jan. 22, 1945; for antioxidant; since Dec. 4, 1944.  
478,938. Victor Unterbrink, as Plastic Products, Ottawa, Ohio; filed Jan. 23, 1945; for liquid plastic coating; since Sept. 1943.  
479,038. A. C. Horn Co., Long Island City, N. Y.; filed Jan. 26, 1945; for paint enamel for metals; since Dec. 26, 1944.  
479,054. Jay W. Stuart, as De-Oxo-Lin Chemical Products, Los Angeles, Calif.; filed Jan. 26, 1945; for fireproofing fabrics, lumber and other inflammable materials, and for admixture with liquid coating compositions; since Oct. 27, 1939.  
479,390. Lanair Chemical Corp., Chicago, Ill.; filed Feb. 3, 1945; for oil sludge emulsifier; since Oct. 23, 1942.  
479,409. American Cyanamid & Chemical Corp., N. Y.; filed Feb. 5, 1945; for resins having base or ion-exchange characteristics; since Sept. 11, 1942.  
479,858. Stanco Inc., Wilmington, Del., and New York, N. Y.; filed Feb. 15, 1945; for solvent; since Feb. 11, 1924.  
479,930. Hall Hardware Co., Minneapolis, Minn.; filed Feb. 17, 1945; for gloss paint; since Dec. 12, 1944.  
479,932. Hall Hardware Co., Minneapolis, Minn.; filed Feb. 17, 1945; for paint enamel; since Dec. 12, 1944.  
479,967. Cordo Chemical Corp., Norwalk, Conn.; filed Feb. 19, 1945; for corrosion resistant paint; since Feb. 2, 1945.  
480,052. Elgin Softener Corp., Elgin, Ill.; filed Feb. 21, 1945; for ion exchange materials of zeolite type; since Jan. 2, 1945.  
480,204. L. Sonneborn Sons, Inc., N. Y.; filed Feb. 24, 1945; for detergent; since June 9, 1944.  
480,206. L. Sonneborn Sons, Inc., N. Y.;

filed Feb. 24, 1945; for rust inhibiting paint; since 1932.  
480,207. L. Sonneborn Sons, Inc., N. Y.; filed Feb. 24, 1945; for soft soap concentrate; since 1943.  
480,212. L. Sonneborn Sons, Inc., N. Y.; filed Feb. 24, 1945; for detergent; since 1935.  
480,413. The Foy Paint Co. Inc., Cincinnati, Ohio; filed Mar. 2, 1945; for paints; since Feb. 8, 1945.  
480,485. Vita Var Corp., Newark, N. J.; filed Mar. 3, 1945; for paint; since Nov. 11, 1944.  
480,649. National Oil Products Co., Harrison, N. J.; filed Mar. 3, 1945; for detergent; since Feb. 17, 1942.  
481,512. The American Varnish Co., Chicago, Ill.; filed Mar. 30, 1945; for paints; since June 1940.  
481,592. The Tremco Mfg. Co., Cleveland, Ohio; filed Mar. 31, 1945; for enamel paint; since Mar. 9, 1945.  
481,652. Sewall Paint & Varnish Co., Kansas City, Mo.; filed Apr. 2, 1945; for paints; since October 1944.  
481,788. Herbert J. Heribert, N. Y.; filed Apr. 6, 1945; for plastic; since Jan. 12, 1945.  
481,797. Niagara Sprayer and Chemical Co. Inc., Middleport, N. Y.; filed Apr. 6, 1945; for insecticide; since April 1927.  
481,828. The Arco Co., Cleveland, Ohio; filed Apr. 7, 1945; for paint resistant to gases; since Apr. 1, 1936.  
482,331. Keystone Lubricating Co., Philadelphia, Pa.; filed Apr. 19, 1945; for lubricating oils; since Apr. 12, 1945.  
482,365. Eastman Kodak Co., Jersey City, N. J., and Rochester, N. Y.; filed Apr. 20, 1945; for photographic chemicals; since Nov. 28, 1944.  
482,598. Swift & Co., Chicago, Ill.; filed Apr. 25, 1945; for insecticide; since Apr. 1, 1943.  
482,723. American Aniline Products, Inc., N. Y.; filed Apr. 28, 1945; for textile dyeing assistants; since Mar. 27, 1945.  
482,856. Synvar Corp., Wilmington, Del.; filed May 1, 1945; for phenol-formaldehyde resins; since October 1942.  
482,858. Synvar Corp., Wilmington, Del.; filed May 1, 1945; for urea-formaldehyde resins; since October 1942.  
484,201. The Firestone Tire & Rubber Co., Akron, Ohio; filed June 6, 1945; for rubber adhesive compositions; since Jan. 24, 1945.

Trademarks reproduced and described include those appearing in Official Gazette of U. S. Patent Office, July 10 to August 7.

**HANDEE**

FIRE EXTINGUISHER  
415,161

**ALKALI SPECIAL**  
415,169

**aerfloted**  
415,264

**HARTOLAN**  
462,069

**CELLOFAS**  
462,882

**PLASTOSYL**  
463,589



469,309

**DITRAN**  
469,386



469,472



470,171

**ORTHOPHEN**  
471,198

**KONTOL**  
472,785



474,103

**FLEXITE**  
474,847

**VULTAC**  
475,376

**RPN**  
475,999

**SHEDZ**  
476,035

**MA-WA**  
478,463

**24M6B**  
478,906

**LINO-PLASTIC**  
478,938

**KERATYN**  
479,038

**DE-OXO-LIN**  
479,054

**LANCO-OIL SLUDGE EMULSIFIER**  
479,390

**IONAC**  
479,409

**DIPEX**  
479,858

**PLASTI-FILM**  
479,930

**PLASTI-FLOOR**  
479,932

**CORDO-GLAD**



479,967

**DURELEX**  
480,052

**PETROSAL**  
480,204

**S.R.P.**  
480,206

**SOLVEPASTE**  
480,207

**SULFATEX**  
480,212

**SULFEX**  
480,213

**LEVELON**  
480,413

**SYNTERGENT**  
480,469

**VITA-CAL**  
480,485

**PLASTIFLEX**  
481,512

**TREMAMEL**  
481,592

**Rev**  
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**HERIBEX**  
481,788

**COPOTEX**  
481,797

**CHEMOX**  
481,828

**VELO-A**  
482,331

**DEKTOL**  
482,365

**LO-TEMP**  
482,598

**BONASOL**  
482,723

**SYNVAREN**  
482,856

**SYNVAROL**  
482,858

**HYTAC**  
484,201

# CHEMICAL INDUSTRIES INFORMATION SERVICE

For more information on any products advertised in this issue of **CHEMICAL INDUSTRIES** check the key numbers on the perforated card. See reverse side.

O1FC Solvay Sales Corp., alkalis for glass industry.

O561 Westvaco Chlorine Products Corp., stabilized chloral.

O562 Mathieson Alkali Works, Inc., sodium chlorite, chlorine dioxide.

O563 Hardesty Chemical Co., Inc., plasticizers.

O564 Evans Chemetics, Inc., thiovanic acid.

O565 Mutual Chemical Co., zinc chromate for paint.

O566 Dow Chemical Co., Dowtherm system.

O1568-9 Niagara Alkali Co., electrochemicals.

O569 Shell Chemical Division, tertiary butyl alcohol.

O571 J. T. Baker Chemicals, chemicals for photographic emulsions.

O572 Ameco Chemicals, Inc., plasticizer 11-2 for vinyl resins.

O573 Continental Can Co., fibre drums, metal containers, liquid-tight paper cups, containers, steel pails.

O574-5 American Cyanamid & Chemical Corp., DDT concentrates.

O576 Eimer & Amend (Fisher Scientific Co.), reagent chemicals.

O577 Barrett Division, phthalic anhydride.

O1576-7 Commercial Solvents Corp., mono-, di-, tri-ethylamine.

O578 G. S. Robins Co., midwestern chemical distribution.

O577 Union Bay State Chemical Co., synthetic latex compounds.

O578 General American Transportation Corp., tank cars for chemicals.

O579 Diamond Alkali Co., standard silicates.

O580-1 Celanese Corp. of America, acetaldehyde, acetic acid, anhydride, acetone, formaldehyde, methanol and butadiene from new Texas plant.

O582 Valvol Corp., AD-6-3 resin for protective coatings.

O583 Stauffer Chemical Co., chemicals for the rubber industry.

O584 Atlas Powder Co., Industrial Chemicals Dept., Spans and Tweens for developing DDT for commercial use.

O585 Proctor & Schwartz, Inc., aroform dryer.

O586 Marblehead Lime Co., high calcium chemical lime.

O587 Baker Castor Oil Co., plasticizers for resins and synthetic rubber.

O588-9 American Hard Rubber Co., Ace hard rubber; Saran pipe and tubing.

O590 Kansas City Southern RR., basic raw materials for the chemical industry.

O591 National Carbon Co., Inc., Acheson graphite anodes.

O592 Chas. Pfizer & Co., Inc., riboflavin.

O1592-3 Sharples Chemicals Inc., synthetic organic chemicals; new Sharples amines.

O593 Reichhold Chemicals, Inc., Chemical Color Division, RCI zinc yellow.

O594 Perocel Corp., bauxite adsorbents and catalysts.

O595 Wilson Chemical Feeders, Inc., Wilson pulsafeders.

O596 American British Chemicals Supplies, Inc., manufacturers, importers, exporters.

O597 Walter Kidde & Co., Inc., new trigger control valve on 10, 15 and 20-lb. fire extinguishers.

O598 Prufcoat Laboratories, Inc., protective coatings.

O599 Neville Co., coumarone and modified coumarone resins.

O600 Wm. Powell Co., aluminum valves.

O601 Columbia Chemicals Division, Pittsburgh Plate Glass Co., Silene EF.

O602 Wyandotte Chemicals Corp., heavy chemicals.

O603 Joliet Chemicals, Ltd., silica gel.

O604 Wellington Sears Co., industrial fabrics.

O605 International Minerals & Chemicals, phosphates for industry and agriculture.

O606 Armour & Co., neo-fats, pure fatty acids.

O607 Mallinckrodt Chemical Works, pyridyl-mercuric acetate.

O608 Tacoma Chamber of Commerce, basic raw materials and locations for plants in Tacoma, Wash.

O609 Glycerine Producers' Association, uses of glycerine as a plasticizer.

O1608-9 Columbia Chemical Division, Pittchlor—highest calcium hypochlorite.

O1608-9 Pennsylvania Salt Manufacturing Co., potassium chlorate.

O1608-9 Griscom-Russell Co., atmospheric G-R Bentube sections; heat transfer apparatus.

O610 Chemical Construction Corp., acid recovery and production processes and equipment.

O611 Hoover Electrochemical Co., lauryl chloride; benzene derivatives.

O612 Premier Mill Corp., colloid mills.

O613 Baker & Adamson Div., calcium acetate.

O614 Reilly Tar & Chemical Corp., para ethyl-phenol.

O615 Prior Chemical Co., sodium tungstate, tungstic oxide, sodium molybdate, molybdic acid and oxide.

O616 Natural Products Refining Co., bichromates of potash, soda.

O619 Oronite Chemicals, dielectric quality polybutenes.

O620 Commercial Solvents Corp., 2-methyl-2, 4-pentanediol, technical data bulletin.

O653 Monsanto Chemical Co., pharmaceuticals.

O655 Victor Chemical Works, phosphates, formates, oxalates.

O656 Wood Treating Chemicals Co., toxic and water-repellant solutions.

O656 Pacific Coast Borax Co., borax, boric acid, borates.

O657 Carbide & Carbon Chemicals Corp., synthetic organic chemicals.

O659 Industrial Chemical Sales Division, West Va., Pulp & Paper, Nuohar activated carbon.

O661 Heyden Chemical Corp., pentaerythritol.

O663 Kelco Co., algin.

O664 Fritzsche Brothers, Inc., technical odorants.

O665 American Cyanamid & Chemical Corp., aero brand acrylonitrile.

O667 Patterson-Kelley Co., copper process equipment.

O669 Blaw-Knox Division, digester equipment.

O671 Signode Steel Strapping Co., steel strapping for packaging and shipping.

O672 U. S. Stoneware, Tygon corrosive-resistant paint.

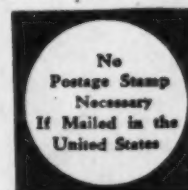
O673 Titanium Alloy Mfg. Co., zircon crucibles.

O674 Ansul Chemical Co., Dugas fire extinguishers.

O675 DuPont Electrochemicals, furan, tetrahydrofuran, 1,4-dichlorobutane.

O677 St. Regis Paper Co., multiwall valve and open-mouth paper bags.

O678 Consolidated Packaging Machinery Corp., Capem, Sealite, and Hoepner packaging machines.



## BUSINESS REPLY CARD

First Class Permit No. 4288, Sec. 510 P. L. & R., New York, N. Y.

Advertising Manager

# CHEMICAL INDUSTRIES

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O679 Crown Can Co., lid trouble.  
O680 Ansul Chemical Co., liquid sulfur dioxide.  
O681 Bemis Bro. Bag Co., waterproof bags.  
O683 Church & Dwight Co., Inc., bicarbonate, sal and monohydrate of soda.  
O683 Allied Asphalt & Mineral Corp., gilsonite, super selecta.  
O683 U. S. Potash Co., muriate of potash; manure salts.  
O685 Eastman Kodak Co., silver nitrate.  
O685 B. L. Lemke Co., acid cyanoacetic; cyanoacetamide; ethyl malonate, etc.  
O685 Metalsalts Corp., mercury and mercurials.  
O686 Lucidol Corp., organic peroxides.  
O1684-3 U. S. Industrial Chemicals.  
O686 Vitamol Laboratory Inc., sorbitol.  
O687 Joseph Turner & Co., caustic soda.  
O687 Mine & Smelter Supply Co., pinch valves.  
O687 Distributing & Trading Co., waxes; candleilla, cersin, etc.  
O689 Consolidate Chemical Industries, Inc., lustra-pearls, bone or hide glue.  
O689 Oldbury Electro Chemical Co., phosphorus trichloride.  
O689 Beacon Co., metallic stearates.  
O690 Welch, Holme & Clark Co., Inc., oils, fatty acids, chemicals, starch, dextrine.  
O691 Paul A. Dunkel Co., gums, chemicals, oils.  
O691 Edward S. Burke, benzoic acid, permanganates, chlorbutanol, benzaldehyde, etc.  
O691 Heekin Can Co., lithographed cans.  
O691 Amend Drug & Chemical Co., new catalog of chemicals and drugs.  
O692 Merck & Co., Inc., quinine sulfate and hydrochloride.  
O698 W. C. Hardesty Co., fatty acids, related products.  
O699 Leeds & Northrup Co., micromax recorders.

O700 Edwal Laboratories, Inc., fine chemicals.  
O1700-1 Merco Nordstrom Valve Co., lubricated valve.  
O701 Innis, Speiden & Co., potash, chloride of lime, ferric chloride.  
O701 Naylee Chemical Co., chlorinated paraffin, hydrocarbons.  
O702 Dow Chemical Co., Dowtherm system.  
O702 Henry, Sundheimer, Inc., silicofluorides.  
O703 American Potash & Chemical Corp., bromine, bromides, potassium chloride, lithium concentrates, etc.  
O703 Talk-A-Phone Mfg. Co., interphone systems.  
O704 General Drug Co., Aromatics Division, floranol, cyclamol, distilled oils, anhydrides.  
O705 Quaker Oats Co., Chemical Dept., furfural.  
O707 Becco Sales Co., electrolytic hydrogen peroxide.  
O707 Franks Chemical Products Co., stearates.  
O707 William S. Gray & Co., sodium benzoate, benzaldehyde.  
O707 E. F. Drew & Co., Inc., fatty acids.  
O707 Eastern Steel Barrel Corp., drums with full removable heads.  
O709 D. W. Haering & Co., Inc., glucosates, proportioning units.  
O709 Texas Gulf Sulphur Co., Inc., sulphur.  
O709 John Van Range Co., stainless steel equipment.  
O710 Kessler Chemical Co., triacetin, fatty acid esters.  
O711 Petroleum Specialties, Inc., HMP aris-towax, refined paraffin wax.  
O711 H. H. Rosenthal Co., drugs, chemicals, oils, waxes.  
O711 Phelps Dodge Refining Corp., copper sulphate.  
O711 R. W. Greeff & Co., tricresyl phosphate.

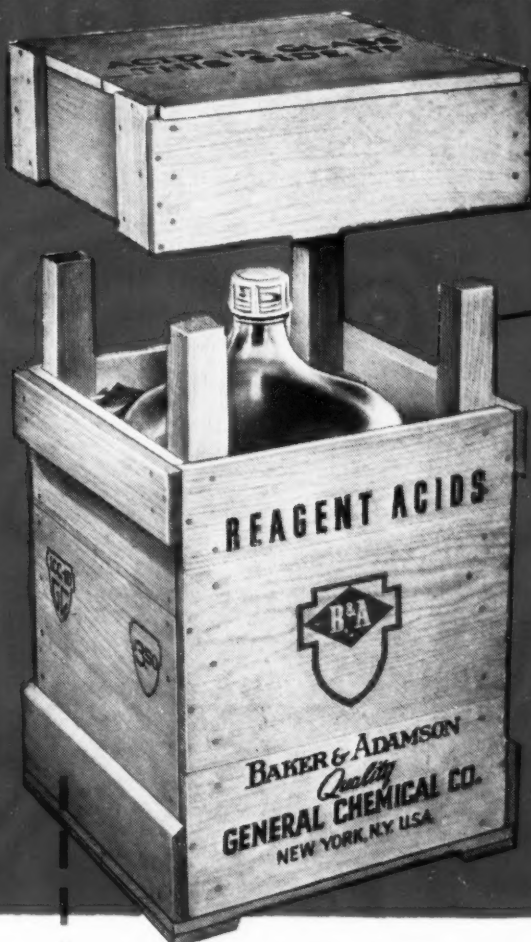
O711 Hunt Chemical Works, Inc., potassium ferricyanide.  
O713 Columbia Organic Chemicals, methyle iodide, dodecyl chloride, etc.  
O713 Crosby Naval Stores, Inc., pinene, pine oils, resins, etc.  
O713 Filter Paper Co., filter media.  
O713 Radio Receptor Co., electronic, dielectric heat generators.  
O715 Fukon Bag & Cotton Mills, waterproof bags.  
O715 Industrial Supply Co., Ltd., exports to S. A.  
O715 Henry Bower Chemical Mfg. Co., aqua ammonia, calcium ferrocyanide & chloride, trisodium phosphate, etc.  
O715 Pennsylvania Coal Products Co., resorcin, catechol.  
O716 U. S. Industrial Chemicals, Inc., Ar-plax, 906.  
O716 Jefferson Lake Sulphur Co., sulphur.  
O716 Walter Moesch & Co., exports vit-erland.  
O716 Sherwood Refining Co., Inc., sulfonates, waxes, white oils, petrolate.  
O721 Cowles Detergent Co., deterg-ates.  
O721 Fine Organics, Inc., phar-icals, insecticides, germicides, research ch.  
O721 Oil States Petroleum, technic e oils.  
O721 Saranac Machine Co., bag  
O724 Marine Magnesium Products nesium carbonates, hydroxides, oxia  
O725 Accreylon Co., export manage  
O725 Wellman Engineering, deep digging buckets.  
O726 Harshaw Chemical Co., book on industrial chemicals.  
O726 Niacet Chemicals Division, ac ete s lta  
O726 D. S. Dallal, gums.  
O727 Otis McAllister Co., exporters.  
O727 Standard Alcohol Co., isopropyl alcohol.  
O728 Litholoyds Corp., lithium and calcium, hydrate and hydride.  
O734 Engineers Specialties Division, detail engineers' glass.  
O735 Chas. L. Huisking & Co., pharmaceutical drugs, oils; industrial raw materials.  
O735 Burkart-Schier Chemical Co., synthetic detergents.  
O747 Raymond Bag Co., multiwall shipping sacks.  
OIBC General Chemical Co., reagent acids and ammonia in new 6 1/2 gal. screw-cap, boxed carboy.  
OBC Witco Chemical Co., carbo black.

**CHEMICAL INDUSTRIES:**  
We'd like to have more information on following:

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# General Chemical INTRODUCES



6½ Gallon Carboy  
Completely Enclosed  
Screw Cap Closure

POURS EASILY

HANDLES EASILY



STORES EASILY

## Featuring!

### "ONE-MAN" PACKAGE

Compact . . . saves labor  
. . . lower gross weights  
make possible *one-man*  
handling and storage—

Sulfuric Acid	138 lbs.
Nitric Acid	113 lbs.
Hydrochloric Acid	102 lbs.
Ammonium Hydroxide	86 lbs.



### "PURITY SEAL" COVER

Completely encloses bottle,  
keeps out dirt, prevents  
sunlight damage to pure  
acids.



### POUR-CLEAN LIP

Superior pouring control  
. . . easier emptying into  
small containers.



### SCREW-CAP CLOSURE

Added security in sealing,  
yet simpler opening and  
closing. Keeps bottle neck  
clean, protects acid from  
contamination.



### SAVES STORAGE SPACE

Store *more* acid in *less* space . . . rec-  
tangular solid package with reinforc-  
ing corner posts adaptable to storage  
in solid tiers, or on pallets. Takes less  
room than commercial carboy with  
protruding neck.

### "FULL VIEW"

Contents completely visible . . . acid  
level easily determined.

### EXTRA STRENGTH BOTTLE

Designed for superior strength and  
uniformity.

### RESISTANT COATING

Entire box weather-proofed for longer  
life and better appearance.

## "THE CARBOY OF TOMORROW" Today! For B & A Reagent Acids and Ammonia

Chemical packaging makes a signifi-  
cant advancement with the advent of  
the new 6½ gallon, screw-cap, com-  
pletely boxed carboy . . . and General  
Chemical Company leads the way by  
pioneering this superior modern  
container for its Baker & Adamson  
Reagent Acids and Ammonia.

Here is a carboy that protects the  
high purity of B&A products and safe-  
guards their quality for the user even  
under adverse conditions. Study its

many special features. Note how they  
provide an ease of handling and stor-  
age impossible with ordinary carboys.

These are advantages industrial  
users of reagent acids, laboratories,  
colleges and others will welcome as  
the answer to their special require-  
ments. You will want them, too . . . so  
order B&A Reagent A. C. S. Acids  
and Ammonia in this new carboy *now*.  
Limited shipments soon to all points  
east of the Rockies.

## GENERAL CHEMICAL COMPANY

40 RECTOR STREET, NEW YORK 6, N. Y.

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In Canada: The Nichols Chemical Company, Limited  
Montreal • Toronto • Vancouver

BASIC CHEMICALS



FOR AMERICAN INDUSTRY



## *"5,000 Miles without a Blowout"*

Remember back in 1920 when 5000 miles without a blowout was something to brag about? In those days a tire and tube cost around thirty-five dollars...and tire changing was a back-breaking job that called for overalls, hammer and pinch bar, plenty of muscle and a sweet disposition.

Tire making has come a long way since those days—thanks to the progress of the rubber manufacturers and also to the efforts of those industries that supply the compounding materials. Outstanding among these is carbon black. For our modern rubber tires—both natural and synthetic—owe to carbon black a high percentage of their great strength, resilience, flex and abrasion resistance, and durability. Without it synthetic rubber would be useless for tire production!

Since its start in 1920, Witco Chemical has constantly worked to increase the effectiveness of carbon black through research...and is today one of the most progressive producers in the field. Among the recent Witco contributions is a special "furnace type" black that is essential in the pigmentation of heavy-duty military and truck tires. Other Witco developments are special fillers, accelerators, antioxidants, and similar products that improve the quality of rubber products and help to make *less* rubber go a *longer* way. Such progressive spirit is typical of the service in chemicals, oils, pigments and asphalt products that Witco renders to the rubber, paint, printing ink, paper, plastic and other industries.



**WITCO CHEMICAL COMPANY**

[Formerly Wishnick-Tumpeer, Inc.]

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AND EXPORTERS

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